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HORIZONS

November 1984

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We review a clip-on
keyboard for the 64

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Submitting articles

Commodore Magazine welcomes readers' contributions — either articles or program listings. Articles should be typed double spaced with a wide margin. Program sheets, whenever possible be printed out on plain white paper, accompanied by a cassette. We cannot guarantee to return every article or program submitted, so please keep a copy. If you would like your program returned you must include an a r r



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CONTENTS

Letters	7	Advertiser's Club	44
Some technical points cleared up, the list of Polygons (P), and the advantages of Fish		Advertiser's check for SuperSoft bargains	
News	8	Flight Simulator 2	30
Commodore to run a Sprint of the Screen, Typing (typing games), and 64 news		Paul Gerard looks to the air with the impressive Sublogic program	
Vic 20/40	13	Star Wars — For Whom?	33
Following last month's 64 joystick article, Colin Walls explains their use on the Vic		Steve Lee's Modem Ball focuses on the various competing games for the 64	
Software	18	Plot 18 — C&A Control	39
The biggest and best Commodore game software roundup			
Video Dig/Videg	23	The Working C14	41
		An extract from David Lawrence's book on Commodore's new disks	
JetT Martin gives a professional look at Digiboard's Micrograph system for the 64		Software File	73
Profile	26	Readers' programs including game letters on the Vic and Laser Zap on the 64	
Chris Jenkins talks to Steve Lee, author of Polygon Patrol for 'Virgie Software		Imprint	83
Start Here	29	Book reviews including my 'Basic on the Vic and Difficult programming for the 64	
Stuart Corson explains the basics of Basic		Answer Book	85
2-D Graphics	37	Jack Colman's latest look at readers' software and hardware problems	
Adrian Warner presents a program for the 64 with Brian's hints		Technical Correspondence	95
Head-On with Us	43	Donald, producer of the £25,000 Starline price advance, offers on Commodore Speedy 64 voice synthesizer	
David Fox plays on the 64			
Human Factor	44		
David sounds off again, this time with Commodore's clip-on keyboard			

EDITORIAL

NINETEEN EIGHTY FIVE may not be the year of the 16 bit computer. The home market, which has been almost exclusively 8-bit based, is due to evolve into a more advanced, and possibly more stable market. The days of microprocessors such as the 280, 4000 and 6000 are, if not exactly numbered, at least on the wane.

This is not to say that 16-bit computers are either unobtainable or strikingly new — just that up to now they have been mostly confined to business and specialist personal machines such as the Apple Macintosh. Spectra was arguably the first company to break the mould with the 1299 QL, based around the 68000 chip. But, many people would dispute the machine's claim to be a true 16-bit machine (based as it is on 8 bit bytes).

However, Commodore has announced its intention of joining the field with the purchase of Amiga, a small hardware company based in Santa Clara, California. This company has built a 16-bit home computer which is expected to cost less than £1000 (£750). It should appear in Commodore colour some time next year and might even be on display in the Computer Electronics Show in Las Vegas in January.

Just to complicate matters still further — Amiga is using Amiga for £1000 for alleged breach of contract. Amiga had a development contract with Atari while the latter was still owned by Warner Communications, though the contract was subsequently cancelled by Amiga.

Given that the Japanese have based their MSX standard on the 8 bit Z80 chip, I imagine some 16-bit competing manufacturers to upgrade the specifications of their machines. Perhaps Spectra, which has just launched its 8-bit Spectrum 4+, will enter the fray with a cheap 16 bit game machine at this for Christmas 1985. Certainly Atari seems to be looking at this direction.

The horror for judging home computers on the amount of RAM they contain may be passing. The one conclusion could be whether it is 8 or 16 bit — or maybe even 32 bit?

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LETTERS PAGE

D-I-Y reset

I HAVE managed to construct a very simple reset button for the 64 by connecting a push-in computer switch across pins 69 and 70 on the rear panel. Pressing the button has the same effect as 2Y SW176, but of course is independent of the keyboard, as any RESET/STOP/RESTART/PAUSE/PAUSE key are considered useless.

Construction is as complicated as you like, my switch uses 51p and took only three operations of a solder to assemble. This however is the luxury model, and the "dinosaur" can be made for nothing at all using a short piece of wire or a paper clip! The pins need not 1 (ground) and 2 (reset) ONLY, but pins 4 and 5 acknowledge the board.

Crucible clips with the lower jaws taped over, or pieces of edge connector can be used to screw up the pins, and the effect is to return the 64 to Basic. You could then, for instance, PEEK addresses 2040 to 2047 to look at the bytes — the rest is up to you!

Paul Smith
Wall
E. Yorkshire

Kiwis compute

THANK YOU for your interesting and helpful response, which is available every month in New Zealand, unlike some such as "Computer" which we have not seen since April.

A plea for overseas readers — we don't have enough time to star your competitors by the end of the cover month.

We run a very successful User Group and have a library of cassettes and books and a 1500 printer/ploter. Tapes can be borrowed freely, and a club we can afford to buy more programs than people would individually — although they use a small foreign bank, arcade games averaging £75-£90, though good arcade games have come down recently to £25-30.

Please, more educational programs and programs for the 3200.

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Beating Beach Head

WITH RECORD as the best on BeachHead from the Streets of Mad Glamorgan, high scores can be achieved after a single attack on the tank screen — when the post

money tank appears. Shoot it and keep shooting at the 1000 point score flash — it will add 1000 points each time you hit it. This doesn't leave it too late as you'll crash.

My high score on BeachHead is 136,000.
Steve Miller
Preston

WE'RE STILL pondering whether to include a high-score section in Mountain Air comment?

Back- answer

I RESPOND TO THE "overly" technique for Back programs, described in Answer Back in August.

I read out a pain program on my Ya, and found that the new program would retain all memory variables correctly from the old, but that each entry would be the wrong entry would frequently be returned. I would be most grateful if you could let me know how to overcome this program on the Ya.
John R. Dunlop
Chrywell
Essex

THE answer relates to all Commodore machines. If a string is defined in the text, then that string is taken from the first open program execution. However, when you load another program that text is overwritten, and that pointer then calls up an empty garbage

When a string is created by the program, then the string

are stored in high memory, growing downwards from the top of basic.

These are safe from being overwritten by LOAD from within a program.

The answer to your problem, then, is to modify the string without changing it, and the well-known string will reside in high memory. For instance, if your program has made 100 slots "NAME", then after line 100 is read 100 slots "NAME" slots all " ".

The " " slots a null, and has no effect on the length of the string.

Time, gentlemen...

I'M WRITING to reply to John Wynn's problem with Palgrave. When you get to the binary sign, show your paying slot and customer number. After doing this you can return to the menu, say something, and quote his chart.

Ever Yours
Yvonne

IF THINGS go on like this, we'll have to start up an adventure column. What do you think?

It's in the chance to add your views — send your tips, complaints and suggestions to Letters Page, Commodore Magazine, 18-18 Little Newport Street, London WC2E 8LD.



Tymac all talk?

TYMAC TALKS look like making a big splash on the Commodore software market, when the games, which incorporate speech effects generated with no extra lead wires, are released in the UK.

Tymac's origin is as a manufacturer of precision engineering tools in the USA. From there the company drifted (and into home-computer peripherals, and now a range of Tymac software is to be marketed by a UK company.

Speech comes John Sage explained that the speech routines, developed specially by Tymac, add an extra dimension to the games without adding the cost of speech synthesizer hardware. Moreover Tymac's graphics routines are very impressive, especially on the 20 games like *Sassaparil*, an exciting martial arts brawling game, and *Chinaman*. Designed as underground, streetwise missions featuring colourful perspective graphics.



Tymac's first release will be *Pipe Run*, which was the subject of an advertisement with the UK Gold label in one issue. *Pipe Run* is a control flight simulator in which you control a fighter equipped to defend airways against enemy attacks.

Other forthcoming titles include *Goldilocks*—a magical woods adventure, *Pegasus*, based loosely on the legend of the *Five Claws of the Elites*, *Wolf* (which is similar to *Wolfenstein*), and *Type-Writer*, a typing routine program which is specially free.

Tymac games will be £14.95 on disk and £19.95 on tape. Contact John Sage, Tymac/Melrose House, Callington Road, Exhambrook, Devon, Exon, SA2 8JH for further details.

CBM's spirit of adventure

COMMODORE'S new high-end software made adventure *Spirit of the Stones* offers all points of interest "adventure", as well as the chance to win a share of the Kinship Fund based on the number of units sold.

The book on which the program is based is by John Worley, and is set on the Isle of Wight. The supernatural adventure is a story of a smuggler, marooned remote area, and hidden diamonds, offers clues to the location of the prize on the Isle itself—but you don't need to travel to solve the riddle and find the treasure.

The book was released in the South of England six months ago, and already four of the printed copies have been found. When the Commodore

book-and-software package reaches the shops in November, it will include more



clues in the search game, which features a working map of the island and 21 islands

challenges showing and spins showing your attempts to find the diamonds. The program is by Ian Gray, responsible for many of Interspin's most successful programs, and Les Bence.

Solving the search game reveals code letters which must be combined with the riddle clues in the book to unravel the mystery of the hiding places of the diamonds and the Great Wight Eye.

The cassette or disk-based package will cost £14.95, and 50p from each sale will be contributed to the Kinship Fund. The Fund will be divided with one share going to each holder of a reference, and up to the Order of the Great Wight Eye. It will be closed in 1990, or at £1m, or when all the references have been found.

Dynamite database

IF YOU HAVE a use for a 64 database program, but don't want to pay 70 or 80 pounds, *Dynamite Software* might have the answer with *Database 64*.

The tape-based program costs £7.95, and allows up to 20,000 records with 15 fields per record, 28 lines per field and 255 bytes per record. The *Database* is menu-driven and contains on-screen help messages. Searching, retrieval, edit, insert, delete and record are fully supported.

Dynamite also offers a 64 *Auto Mailer* (Business Mailer) package, which allows variables, labels, postage and control commands. The *Auto Mailer* will deal with any part of the 64's memory, including the operating system and *Disk* interrupt.

The *Assembler/Disassembler* costs £3.95 on tape, and comes with a manual.

For more details of these and other *Dynamite* packages, contact *Dynamite Software*, BCM 8714, London WC1N 3JX.

Vic on video

IF EVEN the best programming tutorial book leaves you in the dark, perhaps *Master Class Video* can supply some illumination.

There are four videos in the *Commodore programming series*, Vc 20 Level One and Two and Commodore 64 One and Two. Each of the one-hour sessions is presented by David Keddell, who demonstrates various and keyboard techniques that entry and

more advanced programming techniques. As a bonus, the soundtrack of the sessions contains three programs which can be loaded into the computer. The video sessions are available in Betamax and VHS formats, at a cost of £49.95.

For details of them and a range of other packages, contact *Demonstr Software*, BCM 8714, London WC1N 3JX.



Master Class video — here or via work

LVL in tune with Echo system

FOLLOWING last month's release of Commander's Menu, Maker steps keyboard for the 64, hardware speaker LVL takes another approach with the introduction of the Echo 1 full size mechanical keyboard.

The Echo-1 is a three octave unit with a wood and metal case, costing £99.95.

Also available is an amplifier output kit, EchoKit, which enables you to connect your 64 to the 2W 32 EchoKit amp-speaker unit. This,

with 6 inch dual cone drivers, has volume and tone controls and a speaker cabinet.

The Echo 1 keyboard comes complete with a software package, Organ Maker which allows programmed and real time control of the 64's chip. Additional EchoKit packages are in preparation.

We hope to carry a full range of the Echo system on a forthcoming issue.

Contact LVL, Rossmore House, Sandhurst, Wokingham, RG62 7BQ.



LVL 1, All rights reserved. 005-0765-100-25-34

Oswald, Erik and Jim's adventures



Murray and Joan go out with Ales.

MIRASOL PUBLISHING has announced three more "book-worm" packages based on best-selling paperbacks.

The Saga of Erik the Viking, by Murray Pearson war and modernized Terry Jones, contains 64 programs and a 30-page booklet. It's a text adventure programmed by Level 5, costing £9.95.

Henry Harrison's The Shattered Shell that Saves the World is an illustrated text adventure complete with a

copy of the hilarious gift spoof paperback starring slippery Jim DeGus, the galaxy's silliest comedian turned secret agent. Cost is again £9.95, as is that of The Normal of Time, an illustrated text adventure based on Michael Moorcock's Orson Welles story. Programmed by Ghada, The Normal... comes with a 14-page booklet. Contact Mirasol, 187 Upper Street, Islington, London, 00 226 8828.

Mirrorsoft seeks the practical touch

MIRRORSOFT, known so far largely as a producer of games aimed at the young and the casual, has branched out into "practical software." The Home Discovery series is a suite of five programs for the 64 and other machines and comprises a wealth of useful programs, "The Jello Plot", a "Know Your Own Personality" package based on a book by Hans Mynhoff and Glenn Wilson "Know Your Own Face?", a profile, self-testing program by Carl Dreyfus, Head of Experimental Psychology at Cambridge, "Your history", an anniversary program developed in cooperation with the London Planetarium, and "Mastermind", the program of the

program, courtesy BENTY. Most of the Home Discovery series has been written by Ivan Dray, Software Consultant

version will cost £9.95 and disks £15.95, and the packages will be available next order from Mirrorsoft.



Home Discovery - 64, Know Yourself

Supabasic offers 72 extras

INTERCEPTOR, best known for window games for the 64 and the 32, has made an entry into the software market.

Supabasic Supabasic is a Basic extension package adding 72 programming commands for the 64. Areas covered include file and graphics, sound, screen control and programming aids. The package comes with a 40-page manual.

Supabasic sets a precedent by being available at the same price for disk or cassette versions - £9.99.

We'll be reviewing Supabasic in a future issue. Meanwhile contact Interceptor at London House, The Grove, Tadley, Hampshire for more details.

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Pulling the switch on Vic joysticks

Colin Wells explains how to program the switch joystick

WHEN THE Vic 20 was first designed, it was intended primarily as a games machine. While it can be used for other purposes, the Vic is supplied with a selection of features with games in mind. One of the most useful and widely applied is the switch joystick. This is quite cheap, rugged and simple, but provides a reasonable means of moving things around the screen.

The switch joystick is composed of five switches, each of which, when closed, connects an output pin to ground (in CV, pins 4). One switch is connected to the "Fire" button (often at the end of the stick). The other four switches correspond to the four directions of stick movement: "north", "south", "west" and "east". These four switches may also be operated in pairs, corresponding to the conventional positions (to north-east, north-west, south-east and south-west).

On the Vic, the joystick is plugged into the stick pin connector on the side of the machine. The pins are numbered left to right, top to bottom and used thus:

```
pin 1 — north
pin 2 — west
pin 3 — east
pin 4 — fire
pin 5 — pin 4 (normally)
pin 6 — fire button
pin 7 — +3V (normally)
pin 8 — GND (VIA)
pin 9 — pin 8 (normally)
```

Armed with this information, the user was described below and a suitable program called a "pin 4 connector" (normally in the trash), connecting any one of up to four switches to the Vic should not be slow.

Since the joystick is so useful and the hardware so simple, it's a shame that the designers of the Vic didn't make it easier to use from a BASIC program! Everything is OK if you just want to look for north, south, west and fire. These are connected to bits 2, 1, 4 and 3 of port A of VIA of 1. This means that PEEKing \$D10F (\$D11) gives access to the data.

If you want to detect the joystick in the rest positions, it's a bit of a problem. This

switch is connected to bit 7 of port B of VIA of 1. This would simply be odd and a bit inconvenient, except that this port (all 8 bits) is good for output to the keyboard matrix.

To overcome this problem, it's necessary to change the direction of the bit to input (temporarily) by PEEKing a 0 into bit 7 of the data direction register (to put a value of 03F into \$D134, \$D125), before PEEKing \$D10F (\$D11). Don't forget to PEEK the direction register back to 255 or you'll find that parts of the keyboard don't work! A side-effect of the earlier odd design is that some keys (1, 4 and 10COM+CLR) behave oddly when \rightarrow

FIG. 2 - SIMPLE MACHINE-CODE JOYSTICK DRIVER, WITH LOADER

```
10 H=0
20 READN4
30 IFN4=XX THENN5
40 H=H+1
50 GETD38
60 RESTORE
70 A=PEEK($D33)+255/PEEK($D34)
80 A=A-N
90 AH=A/255,AL=AH*255
100 POKED35,AL/POKE$56,AH
110 POKED37,AL
120 POKED34,AL:POKE$35,AH
130 POKED31,AH
140 CLR
150 H=PEEK($D51)
160 H#="E123456789ABCDEF"
170 A=PEEK($D33)+255/PEEK($D34)
180 FORI=RTOR+H-1
190 READN4
200 H=0
210 FORI=1TO16
220 IFLEFT4(N4,I)+MID4(N4,I,1)THENH=H+1
    =1
230 IFLEFT4(N4,I)+MID4(N4,I,1)THENH=H+16
    4(I)-1
240 NEXT
250 POKEL,H
260 NEXT
270 NEW
1000 DATAN3,2F,8D,22,91,AD,11,91,49,FF
1010 DATAD3,3C,83,FD,7D,20,91,49,FF,20,0
0
1020 DATAD5,FB,83,FB,49,FF,8D,22,91,00,*
*
```

FIG. 1 - SIMPLE BASIC JOYSTICK DRIVER SUBROUTINE

```
ROUTINE
1000 POKED3154,1,2F
1010 J=H*NOTPEEK($D3137)
ANDOR($D3137,NOTPEEK($
1132)AND128)
1020 POKED3154,255
1030 RETURN
```



```

1000 DATA 9, 7F, 8D, 22, 91, 8D, 11, 51, 49, FF
1010 DATA 29, 3C, 85, F8, 8D, 28, 91, 49, FF, 29, 8
1020
1030 DATA 83, F8, 85, 83, 91, 3D, 48, FF
1040 DATA 8D, 22, 91, 4C, 8F, EA, 88
1050
1060
1070
1080
1090
1100
1110
1120
1130
1140
1150
1160
1170
1180
1190
1200
1210
1220
1230
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1980
1990
2000

```

4 The joystick is in the real position (00 00). Figure 1 contains a simple BASIC sub routine to drive the joystick. On screen, the variable positions list are as follows:

```

100 0
101 0
102 - north
103 - south
104 - east
105 - west
106 0
107 0
108 0

```

```

FIG. 4 - BACKGROUND JOYSTICK DRIVER (line 3
7), USE LORDER AND INSTALLER FROM FIG.3
1000 DATA 9, 7F, 8D, 22, 91, 8D, 11, 51, 49, FF
1010 DATA 29, 3C, 85, F8, 8D, 28, 91, 49, FF, 29, 8
1020
1030 DATA 83, F8, 85, 83, 91, 3D, 48, FF
1040 DATA 8D, 22, 91, 4C, 8F, EA, 88
1050
1060
1070
1080
1090
1100
1110
1120
1130
1140
1150
1160
1170
1180
1190
1200
1210
1220
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1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

```

```

FIG. 5 - KEYBOARD EMULATION JOYSTICK DRIV
ER, USE LORDER AND INSTALLER FROM FIG.3
65 M-N-22
140 PDR=67370884
905 DATA 13, 91, 13, 1D, 8D, 8D, 8D, 8D, 8D
1000 DATA 9, 7F, 8D, 22, 91, 8D, 11, 51, 49, FF
1010 DATA 29, 3C, 85, F8, 8D, 28, 91, 49, FF
1020 DATA 29, 88, 85, F8, 85, F8, 49, FF, 8D, 22, 8
1030
1040 DATA 83, F8, 85, 83, 28, 8D, 2D, 48, F8
1048 DATA 8, CB, 84, F8, 28, CB, CB, 88, F8, 21
1052 DATA 8, CB, 80, F8, 1C, CB, CB, 18, F8, 17
1056 DATA 8, CB, 84, F8, 12, CB, CB, 14, F8, 8D
1060 DATA 8, CB, 88, F8, 28, CB, CB, 18, F8, 8D
1064 DATA 8, CB, 85, 85, 85, 82, 8D, 7F, 82
1068 DATA 8, 81, 85, CB, 4C, 8F, EA, 88

```

The program in Figure 3 loads a background program which scans the joystick and places the result in the form used in the program in Figure 1) on location 20 (PDR) so, to read the joystick use:

```

J = PDR/255
if jgt zero
  The alternative loaded by the program in Figure 4 places the result in the four variable defined by the BASIC program (which should be an array). For example:
  10 J0 = 0
  20 PRINT J0
  30 GOTO 20
  prints the joystick value continuously on the screen
  The second of the two variables has the advantage of speed, since an integer variable access is faster than a PEEK, is both than the background program is killed by RUN/STOP instructions. They may be deactivated by S/S 678
  At least one other computer (I won't say which, but suffice it to say that it's not a Commodore) has a joystick interface combined with the keyboard scanning circuitry. This means that the joystick may behave like the keyboard, or with CP/D.
  The program in Figure 1 loads a background routine to achieve a similar effect. The same values as the DATA statement in line 103 represent the ASCII in CHR$(n) codes corresponding to: dir., north, south, east, west, north-east, north-west, south-east and south-west, respectively. The fire button takes precedence over the stick directions. With the given value, the joystick moves the cursor around, using north, south, east and west, by simulating the cursor control keys.
  This approach is really my favourite. The main advantage is that program may easily be written to use the joystick or keyboard with no conversions. It would, therefore, be simple to add joystick control to a program written to use the keyboard. Again, the background program may be killed with RUN/STOP EXECUTE and revived with S/S 677
  A somewhat earlier than any the joystick could be connected to the Vic using the joystick interface. This is quite a useful technique since a 5v power supply is also available on the same connector. It may be made even more flexible by providing some logic outputs.
  This is simple because the VIA may have an connector configured by software to be input or output, or any combination. This is only possible with the line connected to VIA 4, 1, since the other bit is only "buffered" from the keyboard, when required. The program in Figure 4 cycles all four bits (0-3) 1, 2, 3 and 4 at the connector) between bits 2 and 1, with a period of about 4 seconds.

```

```

FIG. 5 - JOYSTICK OUTPUT
DEMONSTRATION PROGRAM
10 PDR=67370884
20 POK=67370884
30 PDR=10000:NEXT I
40 POK=67370884
50 PDR=10000:NEXT I
60 GOTO 20

```

On the wing



A flight simulator for people who can't afford flight simulators. Having inherited the venerable Sublight Flight Simulator 2.0 and ploughed into the ground many a time with Digital Technologies a Flight Pilot, it's just as relevant as anyone to see a flight simulator stepped off its completion.

In **Wing Commander** you must pilot your plane in a confrontation with enemy fighters based on destroying weapons drives and military targets. With the help of a radar map, a clearly represented cockpit, and various on-screen altitude, compass, and warning displays, you can get the feel of a pilot's life and have the pleasure of blasting them out of the sky.

Not too complex graphically, but a great game to play at Christmas. Really good for younger players, and not too bad for old gamers too like me.

Program: Wing Commander, 44

Supplier: Creative Sparks

Price: £7.95

Graphics: ★★★★★

Sound: ★★★★★

Gameplay: ★★★★★

Puffed out?



Pacific Fighting Fantasy gamebooks have made a fortune for authors Ian Livingstone and Steve Jackson, and have made me very jealous. I had the idea years ago, but they beat me at it. You take on the role of a fearless adventurer, and with rolls of a die and choices selected from a small menu, you make your way through the adventure, either advancing past or meeting your doom along the way.

The books are available, but it is a weakness to the Pacific software packages that they reach me slowly to the same extent. This means that you have to wait through some of the best before you come to the point where you have to make a decision,

Soft *Hits*

Pursuing the pixels
and bashing the bytes
of all the new games

and even when you make a choice of the really happens is that you see a mediocre picture of your situation and watch unexcitedly the roll.

If you've got the books, the software doesn't add much to the fun. **Program:** Pacific Fighting Fantasy Software.

Supplier: Puffin Books

Price: £1.99 tape, £4.95 with book

Graphics: ★★★★★

Sound: ★

Gameplay: ★★★★★

Carted away



This could have been a good idea, but Accurate must get used to the idea that the general standard of computer games should be much higher than that of microcomputers. In this case you pilot a fighter/bomber, seen from above in a screen to way along a narrow valley. Badges must be knocked out, tanks and enemy fighters avoided as they pass, and various tactics such as balloons and barbed-wire desks used.



Not much need to explain in depth the highly wonderful style of the other books. Tony Crowther, producer of **Monkey Maze**, **Pony Piggy** and **Blagger**, in **Fast Shuttle Express** is derived from his **Alphatec** game **Leem**, but it is less funny in tone, more violent and graphically

You can start at any point in the game, and there are various skill levels. You can destroy it if you feel things to reflect — a feature and digital game feature, it's always available — and that's about it.

This is one case where although the game is enjoyable to play, it's despite the graphics and sound, which are rudimentary, rather than because of them.

Program: Kase Kase, 44

Supplier: Activision

Price: £9.99

Graphics: ★★★★★

Sound: ★★★★★

Gameplay: ★★★★★★

Gnurds



It's a long time since **Tron** looked a game, though they seem to have weathered the time, had someone will.

Puffer Passo isn't their best, but it's still very ahead of most competitors.

Bill Strickland, **Puffer Passo** extraordinary, most memorable features, points and graphics through the streets of — **Washington**? — flying past in striking **Gnurds**, **Waxwax** and **Dino** **Boats**. The old **Tron** has a charming ladder and stacking your line of power up to the right side. There's a brilliant unerring effect on the main **Tron** **Tron**, and having several one scores you have to move on to the next one.

As is usual for **Tron**, great graphics, chunky music and a funny sense of humor. Watch out for **Waxwax Special**, too — a gem to be even better.

PS — **Gnurds** look like **Tron** — or are there the **Waxwax**?

Program: Puffer Passo, 64

One-way ticket to doom

SHUTTLE

You pack a futuristic command car along a complex of tracks, fighting off attacks from exploding drones, fighter ships and marvellous evolving flying saucers incorporating music by the well-known-generated speech and eye-mind effects. **Shuttle Express** seems very straightforward, but if you can think of a good reason not to buy this one, I'd pity you like to be too.

Program: Shuttle Express, 44

Supplier: Creative Sparks

Price: £7.95

Graphics: ★★★★★★★★★

Sound: ★★★★★★★★★

Gameplay: ★★★★★★★★★

Supplier: Textsoft, 13 High Street, Broomfield

Price: £19.95 on cassette, £19.95 disk
Graphics: ★★★★★★
Sound: ★★★★★★
 Gameplay: ★★★★★★

Nest is best



This one was a winner when it came out on the Spectrum, but it's no more often games cross continents than you might think.

The 3-D effects are good, depicting a nightmare, raised up and tilted by an invisible sea. You can choose your point of view, watching from one angle is useful so that you never lose sight of the progress as they join the top. You can also choose your sex, which is a prescience granted from the point of view of the two or three girls who play computer games.

Armed with grenades you explore the city, searching for your beloved and bombing the axis. The Spectrum version of the game contained all sorts of surprises — hidden ammunition caches, secret rooms and so on — whether the 64 version has the same, one alone will tell. Constantly watch leaving, though not as outstanding now as it might have been had it come out a month ago.
Program: Art Attack, 24
Supplier: Commodore
Price: £19.95
Graphics: ★★★★★★

Around the horn



Jumping left makes space. An Around is a port-headed transporter, derived from Brian Aldiss' *Nebulae Spring*. In the next year this space race separates a 100000 mile distance by the usual loose collection of bodies, in words of the 6 Key Cards and the six Coins of Power. Described as "an adventure for

Supplier: ★★★★★★
Graphics: ★★★★★★

"Ello, 'ello!"



Play. Here is a surreal world, some things a racer on a track, flying gold machines or marked soldiers planning to wipe away the last vest of balloons, while punks on pegs rock boats through the water trying to knock her here off the track, and gravity can add strange things were around just to confuse matters further.

If that's the kind of game you like — you'll like this one!
Program: PC First, 64
Supplier: Astery
Price: £29.95
Graphics: ★★★★★★
Sound: ★★★★★★
 Gameplay: ★★★★★★

Snappy



A game has been responsible for the loss of good staff, but having lost

They Crowbar get great relations, Robin Roger looks comparatively long if he's through — it's well worth checking out. It's all the same business — a game with speech and laser gun, flying through a surreal landscape involving laser beams, alien discs, flying saucers and invisible force fields. You can be a robot, feel crystals to exchange your identity, and if you delay too long between crystals you'll take a steep tumble.

There are 95 crystals to collect, so Robin Roger should keep a few people here for the months to come.
Program: Robin Roger, 24
Supplier: Astery
Price: £19.95
Graphics: ★★★★★★
Sound: ★★★★★★
 Gameplay: ★★★★★★

Green Light



It's only simple like a road traffic light. London interference by using the car to change the way of traffic, lights to change. Two much of a hold-up at any point and you lose.

Multi level, two stages street and unimproved graphics probably best for younger children. It's not even a major contribution to road safety.
Program: Traffic, 64
Supplier: Quilichin, Palmerston Park House, 13 Palmerston Rd, Southsea, Portsmouth
Price: £19.95

Graphics: ★★★★★★
Sound: ★★★★★★
 Gameplay: ★★★★★★

Genuine



The original and genuine, and in many ways a disappointment compared to Dynavision's *Herz*.

As you will know from countless top air versions, *Excuse* features a 45 degree perspective scrolling landscape, over which your fighter flies, with full left-right

systems wanted from the joystick. Guided missiles, gas replenishment, force fields, space fighters and rockets attempt to blast you out of the sky as you make your way through ever more difficult obstacles to finally conquer the Kazan robot. It's all pretty good fun.

Though this version is probably as close as it's possible to get to the original, progressively, the control efforts are gone. But if you want the greatest arcade, this is the one to go for.

Program: Zaxxon, 64

Supplier: IGS Cold

Price: \$9.99

Graphics: ★★★★★★

Sound: ★★★★★

Gameplay: ★★★★★★

Vroom . . .



Lastly, Systems, spin-off from their Locally-subcontracted Oxford Computer Systems. Turbo 64, the race game similar to Atari's Pole Position, only so other cars on track. Software protection system, very annoying. Requires you to be connected to right side when screen displaying various colour checked against special programmed grid on screen. New sound effects in the later segments, which seem to go on for ever. Not much else to say really.

Program: Turbo 64

Supplier: Lorinc

Price: T B A

Graphics: ★★★★★★

Sound: ★★★★★

Gameplay: ★★★★★

Magic!



Vision's corporate snake has certainly been pulled up. The latest offering, though hardly extremely original, is fun, whacky and very polished. As the last surviving magician fighting the evil necromancer you must open the land collecting various weapons, spell books

and potions before confronting the hordes of Stonehenge. Energy, location and inventory are given to the bottom of the screen.

Some colourful graphics as you traverse the 19 screens, super speedy music and sound effects, and an important element of strategy which makes Sorcery much more than just another snake screen arcade game.

Program: Sorcery, 64

Supplier: Yuzo

Price: £6.95

Graphics: ★★★★★★

Sound: ★★★★★★

Gameplay: ★★★★★★

Ugh! slug bugs



Adapted out of all possibility of recognition from an Atari original. This should give a few players late night.

Although it's basically simple—a jungle explorer hopping around a grid of squares, uncovering treasures and avoiding vicious creatures—it's the little details that make this game so refreshingly complex.

Collecting items allows you to trade for pieces of a magic boat, and it's the complexity to complete this quest that gives the game its playability.

What with snake pits to negotiate, Slug Bugs is a great and black hole to fall into, Java Jim's got the lot. Give it a try.

Program: Java Jim, 64

Supplier: Creative Sparks

Price: £7.95

Graphics: ★★★★★★

Sound: ★★★★★★

Gameplay: ★★★★★★

Cave man



It's the latest from Bubble Bus is not overwhelmingly original, but features a few good puzzles (if you can see what I mean) and some of the mass-Chiefos of First.

There are 31 screens to explore, and it's the usual business of climbing ropes

clipping non-eating plants and flying geese, and starting within the time limit for each cave.

Luckily, the number of times you start each cave is set from 1 to 99, and you can start at any cave in a variety of skill levels.

Not a classic, but well worth checking out for those of you who like a game which certainly can't be defeated in a single sitting.

Program: Cave Explorer, 64

Supplier: Bubble Bus

Price: T B A

Graphics: ★★★★★

Sound: ★★★★★

Gameplay: ★★★★★★

Jolly Wallie



Yet another of the classic bubble/maze Wallie/Win the Bigger table, but an excellent game for all that. Jolly Wallie, who looks like a cartoonist Jolly's escape on legs, traps around a wacky maze-market collecting goodies and avoiding snakes. Every five items he must go back to the checkpoint to refuel.

Bubbles leaves open doors and various wallies fire around menacingly fast of all things, there is a great sense of pace. Featuring Pigures and Jaws Market Jaws's greater hits.

Good graphics and a large playing area. A maze of this sort of game is over long, so if you like speed consider this.

Program: Jolly Wallie, 64

Supplier: Interceptor, London House, The Green, Telford, Here

Price: £7 each, £9 each

Graphics: ★★★★★★

Sound: ★★★★★★

Gameplay: ★★★★★★

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Splitting Images

VIDEO DIGITIZING systems, which allow the output of a video camera to be interfaced to a computer system, have been around for many years now, but mainly in the guise of research projects or very up-market graphics systems. Digiflex has now produced a version of its Macintosh I system which interfaces with the Commodore 64, and which (depending on your affluence), is within reach of home users as well as professionals. The digiflex costs \$2900, but if you have your own camera, you can expect to knock \$1000 off the price.

The system supplied for review consisted of a video camera and tripod, the interface box, connecting leads, manual and software. The camera is a black and white ITC Rangefind 40 model. If the name of the manufacturer is unfamiliar to you, there is no worth mentioning that many broadcast organizations use Rangefind hand-held cameras, affectionately known as "lilies". The model 40 is at the other end of the range, however.

It contains a Videx camera tube and is fixed with an f1.4 lens with a maximum focusing distance of 18 inches. The digiflex handles the signal levels so in order to obtain the best contrast range, it is only necessary to adjust the lens. Although this sounds like an advantage it would help if gain and black level were adjustable. The connections to the camera are a camera supply and video lead — a BNC type socket (both the interface are a supplied lead).

The nearby aluminum box contains the interface electronics called Microscope. Measuring 10 by 7 by 2 inches and has one external control — which is only a power switch. A 10-pin socket carries digital

signals to and from the box, and means must be supplied via the Rangefind connector. Inside the box the quality of construction is high, with all but one power supply resistor mounted on a specially etched ceramic board. The majority of the active components are TTL chips, but at the heart of the interface is an analogue to digital converter IC.

Concerning the interface to the CBM 64 it arrived with 2 cables that plug into the rear port. But, the lead provided with the review package could be plugged into the computer again direct, as no potting was used. The 4 processor version does it in a single lead and it will only cost a few pounds to convert.

Decoding the manual and software that will come with production systems is difficult, since we were provided with pre-production copies. The prototype software was supplied on disk, but production software will be provided on cassette, with the facility for making disk copies. The manual consists of 30 odd pages bound as an A4 folder, but some related to an earlier system for the PET, with a few pages referring to the 64 version. If the final work is as comprehensive as the PET manual then it will be quite adequate, though not designed for inexperienced computer users.

The way that the system works is both interesting and clever. For readers who are not clear about the state up of a video picture, I will give a brief summary, as this is required knowledge if you wish to understand how the Microscope functions. The signal produced by a video camera is a series of lines of picture information interspersed with horizontal synchronization pulses. It's a long wait! that waits for the start of a new field, then a last pulse signals the beginning of each line of video brightness information.

Consequently (up till) the camera is built up a line at a time from the start line, a line takes 64 microseconds to scan and 2BT takes a half, but the length above 2BT,

then so build up the field, which takes a 90% of a second including the field pulse. A second field is required to make up a full video frame. The line advance now comes from between the first set of lines, the method being called interlacing.

When the Microcos interface receives a good signal it starts by the beginning of the first frame. When that arrives the A/D converter is fed the brightness level of the beginning of the first line of the picture. This is converted to a parallel digital signal that is then passed to the rest of the computer, where software handles the information, making it as large as you like that up to 4-bit data is available, giving 154 distinct levels, but only four bits are stored by the computer, resulting in 16 different levels. One bit of picture has been stored, but this takes time, and by now the video signal is going rather from much further along the line. The interface therefore waits for the next line pulse and repeats the process on the 154 dots of the second line, then the third, fourth and so on. Finally, 256 lines having been stored the rest of the field is ignored.

When the next field arrives, which is vertically inverted because of interlacing, the data enough for three processors does not remain and instead is the same number as before. The only difference is that the sample of video brightness is taken from a line further along the line.

After the second field has been stored, therefore, the computer has two adjacent sets of data stored, corresponding to the first two left hand pixels from each line. The first column — each field is processed and a bit video picture has been stored, consisting of 154 by 256 pixels, each recorded to 4-bit accuracy.

Limited resolution

It is at this point that I must advise to misreading you. The description of the hardware does not take into account the limited resolution of the 64 "bits" I hear you cry. "The 64 has a very high resolution" I agree but not quite enough to handle 256 lines and quite some form of grey scaling. The software for the 64 version displays alternative pixels and ignores some at the bottom, giving 100 pixels vertically, and also does not bother with every white level, so the horizontal resolution is 121.

So much for the theory, how well does it work in practice? With a few reserve lines, the answer is "very well". Once I had loaded the system up to the computer, I loaded the software from disk. The first step is to load and run an initialization program. This probes a good deal of machine code very fast and then asks if you have a disc or tape option. Once you reply, the second program automatically loads from the correct source and into ram.

After another delay, for more machine code initialization, the 64 switches to the high res mode and clears the screen. You now need to refer to the instructions again, as all prompts appear on the screen, but operating the software only involves the function keys.

F1 results in an image from the interface. The VIC chip is switched off, so that the CPU is not slowed down and things are more accurate. For five seconds you are presented with a black screen, while the data is captured, and then a 120 by 100 picture is drawn on the bottom left hand corner of the screen. This is a fairly large image with no grey scaling, and only uses a few moments to produce.

It is at this point that I realized that adjusting the camera was going to be a rather long-winded task. So, to speed things up, I looped the video output through the auxiliary input of a VCR, allowing me to view the camera image on a TV and adjust it quickly. Once a well exposed, recognizable picture was coming from the camera, the results of pressing F1 were more encouraging. The image data is only read in by the 64 via function, and is stored in a 12K table.

It is at this point that I discovered that by pressing F3 — the mode key or processing a large, shaded display. The display is not the full screen width, so the 128 pixels are divided in width, and that leaves 64 of the computer's 120 available pixels with nothing to do.

First results of using F3 were impressive, but could be improved with the aid of the third function, F4. This allows the user to adjust two variables used to produce the image. Threshold can have any value between 0 and 255 and affects the overall density of the picture. Increasing this value gives a darker image. Contrast affects the spacing between shades of grey, and can have a value between 0 and 32. Pressing F4 returns you to the first display, where the computer prompts you for new values.

At this point a bug in the software caused its early head. Even when inputting what I thought were valid values, the software occasionally stopped with an "Illegal Quantity" error message. This would only have been too disastrous if I had been able to convert the program, but some of the machine code must have been corrupted by the error. As such was the bug appeared I ended up reformatting the program. Despite this error, and that the



software is still in the prototype stage, so I'm sure this will be sorted out.

When the values are accepted, you are given a quarter screen view of the effect of changing Threshold, and F3 will then display the image using the new variables.

The final function, F7, will return the large picture to its 154-line type picture using 4-bit data precision. Without the correct picture, I was unable to check the results. This is the only way, apart for photography, of preserving your master-copy in print. I am assured that the final version of the software will include a step and data save and recall function, and that it will also be possible to "export" the image to one of the graphics handling packages for further improvement.

Lighting problems

Problem! Lighting. I'd expect to that they are very easily illuminated and have a narrow contrast range system due to interlacing. With a stored contrast range of 18 to 1 and a displayed range of 4 to 1, much experience was involved in bringing out details. Two-dimensional images will fairly stay in tone if you only want modest results, but if grey scaling is desired then careful selection of subject matter is necessary.

A secondary problem was caused by the camera supplied, which suffered from shading in the corners. The corner does not sample the whole frame — the bottom of the frame must be central because there isn't any time here to a standard video signal, and the width must be maintained accordingly to maintain the view of aspect ratio. The amount of this is that the camera shading in the top left corner is accentuated and often proved impossible to "light-out".

Another note of software that will also be available with the system uses the multi-colored or mapped mode of the Commodore 64. Therefore, colours will replace the 64 version number of 64 presentations, with the choice being left to the user. In fact, the software solution is really a question of demand. If you are unable to change what is applied to meet your exact needs then Digichart may well be able to help.

One improvement which I had was taking a still frame from a video recorded by particular machine does not provide a very stable frame, and yet the results were possible.

The hardware part of the system presents some very exciting possibilities. With the right software, Digichart will be able to carry out many practical tasks, and hence more than sufficient reason. I will find the system's functioning and sharing address in their Commodore 64.

Jeff Maylar

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Chris Jenkins interviews Steve Lee, author of *Falcon Patrol*

WHEN WE talked to Steve Lee as *Madness* Sunfire Towers he was going through a period of enforced idleness.

"I've just moved house, and the builders are still working on the roof. Every time they sit up their ladders all the lines blow, so at the moment it's 64's out of scores. I'm spending the time fishing!"

In fact, Steve fails that working as a full-time games programmer has its ups and downs. "The neighbours can't make me out — I get more ray-bunny looks when I tell them what I do. They assume because I'm around the house all day that I'm just idle."

It was another period of enforced idleness which encouraged Steve to become a programmer in the first place. "I had a computer access A level — the only one of three that I was any good at — and my natural experience with computing was using a C&G. I later moved up to the Vic 20, and started writing games because I was bored in class. Unfortunately, I was made co-leader, so with nothing better to do I tried writing some games — the first was *Torpedo*, to *Quintix*."



Steve's early efforts *Torpedo* and *Skylark* were written using the Viccom cartridge, without the benefit of a monitor or disk drive. "Everything was written down on paper," Steve recalls, "but I was very pleased with the results. My next game, *Missile Mercury*, included a 'game' routine on the unexpanded Vic. That's an obscure claim to fame. It was very much a cousin of *Land Rover* — all the game frames had one — and *Virgin* offered me a contract based on it. By that time I'd got tired of a 64, one of the first in the country, and I was looking how to use it, which was hard work because I didn't have full documentation. But working that way I got to know the machine very well."

Steve's first 64 game, *Falcon Patrol*, became an instant classic, and set a precedent for *Virgin* games — people

actually liked it. "When *Virgin* went into the games business people around them of buying their products, because they were a second company I don't think it was very far behind, and in any case the company's quality/price was now — if you look at the ads you'll see that they're pretty descriptive, some of the 'mega-games' and 'virgin' stuff."

Falcon Patrol was chosen with great care as the American Community Electronics Show, and went on to become one of *Virgin*'s best sellers. "In fact, although I never made a fortune from programming, *Falcon Patrol* did finance my move to the new house. Now the *Virgin* base set the price to £2.95, they're selling large quantities mail order, and I get the same payment from a £2.95 mail order sale as I would from a £8.95 store sale."

Falcon Patrol is arguably a *Duke* derivative, but there are crucial differences. First, the background is so detailed that the game is worth seeing just to watch it scroll by. Secondly, Steve is a serious student of strategy involved in using player display to force behind the enemy fighters and blast them before they can blast you, then in loading to reload and re-arm before the next wave comes along. "I wouldn't want a straight shoot-'em-up without an element of strategy," says Steve, "it just wouldn't interest me."

If there was a problem with FPS, it was that you can't stop around chasing enemy fighters for long periods without catching them, just running out of fuel and watching the landscape scroll by. However, by incorporating the advance scroll technique from *Torpedo*, and the attention to detail born of Steve's interest in graphics, *Falcon Patrol* made a big hit. *Virgin* considered ideas for a sequel immediately, but Steve's next effort was on an entirely different track.

"I wanted to do a space game, but I also wanted to add an element of humor to offset the violence. So I came up with *Madness 888* and the *GI-Guns*."

Madness 888 is a sort of anti-hero version of *Madness* Jones. "In another context he could be a wally," says Steve, "but I like him, I might even see him in another game. In fact he's based on a mythical character from my youth. A bunch of my friends had *F-100s* ground up with *Madness 888*," said so on — we used all *Madness 888*. I had been playing around with a spin attack package, and came up with the package

of an ant. It was just one of lots of ideas — I'd like to do something involving skulls too — but it was the best of *Madness 888*."

Madness 888's history is well documented in the game's manual, written by Steve's brother. In this adventure his mission is to rescue his kidnapped sister from the clutches of the GI-Guns. In the first screen he had to circumnavigate a mine, something easy and involving the skills in the second there are hidden letters which must be picked up in order to open the door to the next level, and a man of hidden items which restores *888*'s strength. The third screen is a special which *888* must intercept by knocking holes in the wall with his head, so that he can take refuge from the incoming army. Should he rescue Gena, there's a three-minute cartoon sequence which ends with the underman and being kidnapped again, and the whole thing repeats. *Madness 888*, born of the game Steve has written for this month's issue of *Computer Worlds*, may occur to Steve's next game, but for the moment *888*'s here has on the side.

Steve's latest production is *Falcon Patrol 2*. "We thought for a long time about how we could do a sequel. It changed the background, which was substantially the same as the original, but with more detail. What one of the other programmers at *Virgin*'s team looked at it and changed the scale of some of the buildings, and added the graphics. It sure looks quite different to my original design. I can have things like the life screen and the high score screen worked out, so these wasn't much effort required on this side of things. My brother Dave wrote the music. We use a



TEAC Fortissimo and a King, Mega-Poly to work out the tunes, and we found it and a reader. I've written myself to dump the music there as my program. One thing you've got to say about the 64 is that the sounds are better than the graphics,



although the filters on the 640 chip can be a bit unreliable."

A lot of work on *Falcon Patrol 2* went into the sprite. "I didn't use too many sprites because it uses up a lot of memory. The



background is all user-defined shapes, and the helicopter and the car sprites. The 64 knows that the hills behave some more than just being when the helicopters appear — that is because I've coded the sprite. Gates like *Strategic* or the *Maniac Castle* use only eight sprites, though it looks like there are nine. I experimented with rotation to create nine sprites — you could have 250 quite easily, but due to the storage structure they could only move horizontally. That would be all right for a game like *Freeway*, but not much good in something like *Falcon Patrol*.

"I used to write a machine which would use 16 sprites, using just the standard eight for running. One is used off with the interrupt. It didn't work out because the results were too lousy. On the Spectrum you can define any number of "sprites" you like, but the problem with the machine is the colour clash.

"Another idea I experimented with on 670 was to use the ground, but the speed requirements with the speed processor made it all too complicated. I'd rather take a few lines to their limit than try to cram in too many, so I just used the ground-based flat textures and color patterns.

"The pattern for FP1 are quite different to those in FP2, you can't just come up on the money from behind. The helicopter moves more randomly. In fact there are 22 variables between levels — some of them are quite subtle, adjust more slowly, like the height at which the 640 textures can be used. As levels 1 and 2 there's a lot more flat — you can just adjust speed in the early levels.

"I'm not much of a game player — the highest score I've got on FP2 is 4000. I'm just not motivated I suppose.

"My brother Robert designed the artwork on FP2, and the way it looks and runs. Since I don't see many other games it's a great help to have the opinions of my brothers and the other Virgin programmers — they see and play everything going. I like a few games — I bought a Spectrum just to



play *Fighter Pilot*, and I like *International Soccer* and some of Jeff Minter's games on the 64. But I wouldn't write something like *Virgin's Spectrum game Strugglelog* — I just wouldn't hold my interest across other games. I've got lots of ideas, though, that might be suitable for one of the Virgin programmers — something about *Thunderbolt* trying to keep the legs from blocking the streets, or another idea I had was a more complex simulation. Just like a flight simulator only with a 70 view and banks and so on."

Though Robert sees the new Commodore machines, he doesn't regard them as game playing machines. "I use my 64 for some business applications, Paperclip helps me to do word processing, and some accounts and spreadsheet work. The Plus/4 might do a good applications machine, but Commodore might do better still dropping the price of the 64. They'll certainly have to consider doing that in the case of the C16. If it's to compare with the Spectrum, the 64 would be just right if the price was a little lower, and if it had better colour results too. I think about like speech synthesis hardware, or basically good, but they need a very base before the software houses will take it. Speech software is good in principle, but you need around 30,000 per second for reasonably intelligible results — the memory just isn't there.

"I wouldn't break into a game to look at how it's written — really that isn't what you're interested in, usually I don't like the idea. I think it's the originality of the concept that makes all the difference. That's why my next game is going to be really unusual — no jumping, no simple single quest, the way we've even just to attack games. There are going to be seven or eight characters, one of which the player will control. There's no interactive element, with the other characters trying to stop or help you as you do the job you set out to do. I think FP2 is able to use 40 or 50 sprites with a reasonable amount of detail, using some elements repeatedly in different combinations. The main feature is going to be the graphic effects, with scenes and dialogue like in a film. I don't know what you'd call it — it's neither an arcade game nor an adventure — it's probably not even a game at all."

"I work when the mood takes me, sometimes for up to 12 hours at a time. If I don't feel like working I get overwhelmed by guilt eventually and I get back down on it, but it's not good trying to force an idea — some



thing always turns up if I give it long enough.

"Thunder Ball might be the best of the new games, or maybe not — we'll have to see how it goes. Working with the Virgin team does not always mean ideas coming from all directions." ■

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New users — start here!

If Sammi brought you a Commodore 64 or a Vic 20, you might find yourself sitting in front of your TV watching the cursor flashing, with no idea what to do next. Sarah Cotton explains the basics of Basic, and sets you on the road to programming success.

IF YOU are baffled by your Vic 20 or Commodore 64 then this article should be of some assistance. It covers several basic principles of using your computer in an easy to understand way.

When you turn on your computer you will see a flashing square on the screen. This is the CURSOR, which tells you where the next letter will be printed. You can move it about the screen using the keys in the bottom right-hand corner of the keyboard marked CTRL. The left-hand one will make the cursor move slowly downwards, but if it is used in conjunction with one of the shift keys the cursor moves up. The right-hand key controls horizontal movement and again can be used with the shift key.

You can easily change the colour of the cursor. If you type in a few letters you can well see that they appear in the same colour as the cursor. To change colour hold down the CTRL key along with one of the colour keys. You will notice that the first three letters of the colour are shown on the vertical column of the keys, BLK = black, PUR = purple, WHI = white, GRN = green, RED = red, BLU = blue, CYN = cyan (light blue), YEL = yellow.

The Commodore 64 also has 8 additional colours, which can be accessed using the Commodore logo key or the bottom left-hand corner instead of CTRL.

Line

As well as changing the cursor, you can also alter the colour of the screen and border. For the Vic 20 type the following and then hit the RETURN key.

```
POKE 56789,0
This will give you a completely black screen. Other combinations can be found on page 144 of the supplied manual. On the Commodore 64 you will need to type two lines, each followed by the RETURN key. Forth type this:
```

```
POKE 5280,0
```

This will give you a black border. Now try this:

```
POKE 5281,0
```

The numbers of the other colours are on page 41 of the users guide.

For both computers you can get back to the original colour by holding down the RUN/STOP and RESTORE keys together.

The letters in words and symbols used on the screen in full. On the vertical faces of most of the keys you will see the "FED greater characters". To obtain those on the left, use the Commodore logo key, and for those on the right employ one of the shift keys. If the screen gets a bit cluttered up hold down the CLR/HOME key and shift simultaneously. Without the shift key this will return the cursor to the top left hand corner.

Make sure that you know where the RETURN key is, as you will be using it a lot in the future. It is employed to clear messages or information.

To get your computer to work you will need to write a "PROGRAM" which is really just a set of instructions that

Program 1

```
10 PRINT HELLO
20 GOTO 10
```

Program 2

```
10 PRINT HELLO
20 PRINT 12
30 PRINT 12*3
40 PRINT 12/3
50 PRINT 3+3
60 PRINT 3-3
70 PRINT 3*3
80 PRINT 12/3
90 PRINT 12/3
100 PRINT SWORD + FISH
110 PRINT SWORD * FISH
120 PRINT DAY + NIGHT
130 PRINT 3+3
```

Table 1

SIGN FUNCTION

- + ADDITION
- SUBTRACTION
- * MULTIPLICATION
- + EXPONENTIATION (TO THE POWER OF)

Program 3

```
10 PRINT
```

4 program is divided into lines, each with its own individual number. When the computer is asked to start the program working it begins at the line with the lowest number and then systematically follows through. Type in program one, remembering to hit RETURN after each line. The question mark (?) can be obtained using the keys 'shift' and '?'. If you make any mistakes then you can use the DELETE key to erase any previous characters.

Nothing will actually happen yet — the computer has just stored up the program in its memory. You can check this by typing LIST followed by the RETURN key. This will display the program lines in numerical order regardless of the order they were typed in. When you are ready to get the program working type RUN, but don't forget that RETURN key if you have any difficulties with the program not working check that it is absolutely correct. Any lines which are not right can be re-typed. When you get fed up press the RUN/STOP key.

Comments

Now let us see how the program was constructed. The lines are numbered 10 and 20 so that there are plenty of gaps in between to add extra commands. For example, we would add another line labelled 15 or 17. It doesn't matter how the lines are numbered, so long as the line numbers correspond to the order the program is to be worked.

Line 10 prints or displays on the screen the letters within the quotation marks. You could change the word 'HELLO' to anything else by changing the line. Try this and use LIST to check that the computer has noted your alteration. Adding a semicolon ; after the final quotation mark will produce no interesting effect.

Line 20 tells the computer to go back to line 10 and begin again.

You can erase any line by typing the appropriate line number followed by the DELETE key. Try erasing line 20 in our original program.

If you want to get rid of an entire program use the command 'NEW' followed by the RETURN key. This should always be used with care — once your program has been stored it cannot be retrieved. Always remember to use the 'NEW' command before entering any program from this article to erase any previous program.

Try program two. Remember to use NEW, the RETURN key and RUN to get everything working properly.

Compare the results obtained to the program used and you will see the different ways in which the print statement works. Take note of the different mathematical functions in table 1.

You have already seen how to move the cursor and change its colour. Now let us build these ideas into a program which will print the word 'HELLO' in block 3 spaces down the screen and 9 spaces in. Start by typing program 3.

After the question mark press CTRL and F. You will see a little square appear

Program 1

```
10 LET T=0
```

Program 2

```
20 LET T=T+5
```

Program 4

```
15 PRINT T
```

```
25 PRINT T
```

Program 7

```
10 LET A$= 'HELLO'
```

```
20 PRINT A$
```

```
30 GOTO 20
```

Program 8

```
10 A$= 'HELLO'
```

Table 1

SYMBOL	MEANING
<	LESS THAN
>	GREATER THAN
=	EQUAL TO
<>	NOT EQUAL TO
>=	GREATER THAN OR EQUAL TO
<=	LESS THAN OR EQUAL TO

Program 3

```
10 T=0
20 PRINT HELLO
30 T=T+1
40 IF T=20 THEN STOP
50 GOTO 20
```

on the screen which is called a "control character". It tells the computer to change the colour within the program and now directly as we have done before. Follow this with 3 presses of the cursor down key, 7 presses of the cursor right key, the word "HELLO" and finally a quotation mark. Hit RETURN and RUN the program.

Variables can be thought of as little boxes within your computer which can hold information. The box is given a name so it can be referred to later. For the moment you will be creating 3 types, firstly variables with names consisting of 3 letters, 2 letters or a letter and a number, for example A, TT, H. Each of these "boxes" can only hold one number. If we want to put the number 4 in a variable called T this is what we type (see program 4).

Try the short program out. Now let's add 4 to the variable, as shown in program 5.

4... Run

You will notice that when the print command is used in conjunction with a variable no quotation marks are required. The way we have laid out this short program also illustrates the importance of leaving plenty of gaps between the line numbers.

The second type of variable such as A1, A41. A15 consists of letters or letters and numbers followed by a dollar sign. These can hold strings/groups of letters and numbers but the numbers cannot directly be used as mathematical calculations. Try program 7. You should be familiar with all the commands included.

Up till now we have been using the LET statement to put something into a variable, but it is not really necessary. Thus we could change line 10 in our last program to that of program 8.

Before we see another program using variables let's have a little about IF THEN statements. They can be used in conjunction with variables to set up conditions within programs in the form of "IF something happens THEN do something else". Refer to table 1.

Now let's try program 9. When it is run 1 HELLO's will be printed on the screen. T is the name given to the variable which means that it can only hold a number.

4a... Run

Like 10 makes sure that T is set at 0 and each time HELLO is printed the number held in the box is increased by 1. Line 40 checks to see if T is greater than 3 and if it is, automatically stops the program. Otherwise it continues to line 30.

In the last program we were able to control the number of times an operation was completed. Although the program worked well there is a taller and shorter way of arriving at the same result. Try program 10 which employs a FOR NEXT loop.

This time you only need 3 short lines. I have chosen the variable T again so that you can easily compare this program with our last one.

The computer begins at line 10, sets T at 1 HELLO is printed and the

Program 10

```
10 FOR T=1 TO 3
20 PRINT HELLO
30 NEXT T
```

Program 11

```
10 PRINT HELLO
20 FOR T=1 TO 1000: NEXT
30 PRINT GOODBYE
```

Program 12

```
10 FOR T=1 TO 999 STEP 20
20 PRINT HELLO
30 NEXT T
```

Program 13

```
10 FOR X=18 TO 9 STEP -1
20 PRINT X
30 NEXT X
```

Program 14

```
10 FOR T=1 TO 10
20 FOR X=1 TO 5
30 PRINT "HELLO"
40 NEXT X
50 NEXT T
```

Program 15 - 1a, 2a

```
10 FOR X=12 TO 15
20 FOR T=1 TO 1000 STEP 5
30 FOR X=300 TO 4
40 FOR X=300 TO 1
50 NEXT T
60 NEXT X
70 FOR X=300 TO 0
80 FOR X=1 TO 1000 STEP -1
90 FOR T=255 TO 1000 STEP -1
100 FOR X=300 TO 0
110 FOR X=300 TO 1
120 NEXT T
130 NEXT X
140 FOR X=300 TO 0
150 FOR X=300 TO 0
```

4. NEXT statement sends the computer back to line 30. T is increased to 2 and the program begins again.

When T = 3 and the final HELLO has been printed the NEXT statement sends the computer back to line 10 where T becomes 4. As it is now out of its limits, the program jumps to the line after the NEXT statement or, if there are no more lines, finishes.

Loops

It is often useful to repeat a program in the middle of writing it for a short time, for example to give a new idea to read some instructions. See program 11.

Line 20 creates the delay. The program starts here and T reaches 3000. You will also notice that there is more than one command on this line, each separated by a colon (:

So far the variables in any of the FOR-NEXT loops have only increased by 1 each time. This can be altered as in program 12.

This time the variable increased by 20 each time and HELLO was printed 3 and not 40 times. It is also possible to have negative steps as in program 13.

As first stage program 14 might appear perfectly correct, but in fact the loops have been incorrectly 'nested'. The T loop was started first, so an NEXT statement should come last. Therefore lines 40 and 50 need to be exchanged. Once corrected the program will print the word HELLO 30 times. The X loop prints HELLO 3 times and the T loop repeats this a further 10 times.

The nature of loops is a technique frequently required when making sound effects. Even if you don't yet know how to use your computer's sound facility try the appropriate program, 15(a) for the Vic 20 or 15(b) for the Commodore 64.

The INPUT command is used to obtain information in the form of letters or numbers from the program user. Try program 16.

Blocks

When a question mark appears answer the question and then press RETURN. The variable A\$ holds your name and T your age. You can then use this string variable information to later stages of your program.

REM statements do not affect the way in which programs work. They allow the programmer to add notes around the program or explain its workings, etc. For example, see program 17.

When typing in a program from a book or magazine the REM statements can be omitted so long as you're not removing lines which are referred to elsewhere in the program.

Now that you have written your way through the article, let's end with a final program (18) which includes several of the programs you have learned about.

You should now have mastered many of the more essential principles of programming in Commodore Basic, and be ready to incorporate them in your own programs. ■

Program 10 - GOTO

```
5 FORN=1TO3
10 POKES4256,13
20 POKES4277,10
30 POKES4278,0
50 FORW=15TO8STEP-1
60 FORLP=188TO181
80 POKES4278,85
87 POKES4258,4
70 POKES4275,10
86 POKES4274,LP
90 POKES4273,24
100 POKES4272,60
105 POKES4270,0
110 NEXTLP
120 NEXTW
130 NEXTN
```

Program 11

```
5 PRINT "WHAT IS YOUR
10 INPUT NAME :A$
20 PRINT HELLO :AAA: !!!
30 INPUT HOW OLD ARE YOU :T
40 PRINT "NOW I KNOW THAT :A$: IS :T%
YEARS OLD."
```

Program 12

```
10 REM HELLO PROGRAM
20 REM BY SARAH COTTON
30 PRINT HELLO :REM PRINT WORD ON SCREEN
40 GOTO30:REM BEGIN AGAIN
```

Program 13

```
10 REM INCREASES BY 3, COTTON
20 REM THIS PROGRAM WAS LISTED ON THE 15
30 PRINTER/PLOTTER WHICH CANNOT HANDLE
40 REM THE NORMAL CONTROL CHARACTERS.
40 REM INSTEAD IT HAS ITS OWN CHARACTERS.
50 REM A = CLR-HOME AND SHIFT
60 REM B = CURSOR DOWN KEY
70 PRINT A, "-----INCREASES-----"
80 PRINT B, "HOW MANY NUMBERS DO
90 PRINT C, YOU WANT TO ANALYSE?"
100 INPUT C$, IN
110 PRINT "BZZ, PLEASE INPUT THE"
120 PRINT D, NUMBERS ONE AFTER
130 PRINT E, EACH OTHER.
140 FORN=1TO1000:NEXTN
150 FORX=1TOX
160 INPUT "000000000000. NUMBER :N
170 T=T+A$
180 NEXTX
190 PRINT "000000000000. AVERAGE= :T:A$"
```




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Graphics in 3D

Adrian Worman presents a beginners guide to 3D graphics on the 64 with Simon's Basic

ONE OF the most popular features for the owners of a home machine is to attempt to produce some truly spectacular graphic display. Unfortunately, it is very rare for even experienced programmers to achieve good results — certainly the sort of pictures produced in many games such as *Break Head* or *Alice in Wonderland* are worthy for their rarity just as much as their quality.

All too often, attempts to produce graphics fail through lack of thought or preparation. The aim of this article is to provide a practical demonstration of how a simple 3-D image can be constructed, as well as explaining a little of the theory behind the program.

As soon as a programmer has decided to produce a picture of a given object, a whole variety of aspects must be considered. What is the object to be portrayed? What is the object expected to do? Under what conditions will the object perform these actions?

Alice in Wonderland

The last of these questions may at first sight appear confusing. It refers to how much of the image will show to the viewer, and with what amount of detail. For example, the famous picture of Alice in the Dodger, from *Alice in Wonderland* is extremely detailed, but it is completely static, serving merely as a background for the game characters and providing nothing more as surface. This means that when drawn, the picture will be redrawn continuously, for an exact score from *Break Head* is not made in it, and it is exposed to interference with the user for escape, search to overhead or the ship's move). As a result, to make the picture 'mobile' and also achieve a reasonable response time, the amount of detail is reduced.

What this means in practical terms is that if you want a way for response time, you cannot have a lot of detail. Conversely, if you want a lot of detail, the response time must become unacceptably slower. This generally applies right the way up through to big mainframe computers, and not just for computer graphics. The reason that big computers seem to have the best of both worlds (high detail and speed, such as shown on a television light synthesiser) is simply that they are very fast with vast memory stores, and often have vast hardware to do similar jobs (the so-called 'dedicated' machines).

The option on the Commodore 64 computer does provide an easy way to reduce small quantities of hi-res data to high speed. But, any manipulation of the physical data used in the system will reduce require a lot of time, or a large number of spare patterns which differ from each other

only slightly (and hence 'better performance requires more speed and/or more memory — preferably the former). The advantage is not to expect too much from the available hardware.

But, let us look at what can be achieved. The accompanying program is very general (nothing which will store a 3-D wire-frame or no hidden lines) representation of a cube through space as it rotates about an axis. An elementary knowledge of geometry is assumed, but so long as you understand the concepts of 'angle' and 'co-ordinates', you should be alright.

The first task is to describe the object to the computer. This is done by listing the co-ordinates in space of each of the eight corners of the cube. For the sake of convenience, the cube is assumed to have the origin as its centre.

However, it is not enough just to tell the computer where the points are, we must also provide information as to how they link up to each other. This is achieved fairly simply by listing the pairs of points which connect to each other.

You should also enter the accompanying program. Once you have got this running (instructions exist for other languages are provided) the theory should be clear to follow.

The program uses very few machine dependent codes, and those which are used are taken from the Simons' BASIC command cartridge. Only three special commands are used, and they are used extremely graphics resources. Referring to the accompanying information should help you to convert to other graphics packages or languages which support graphics — such as Pascal or COMAL. A brief description of the main sections of the program follows.

Lines

1000 Purpose
The main part of the program starts here. It subroutines call a ready to hand in this for the cube, and so set up screen parameters to be used in the drawing routine.

1010-1020 The main loop of the program. The cube will be rotated once on your screen, or for each display the new position for the cube near the robot eye, and the cube itself then drawn.

1030 This line (BASIC 3.0 number the Commodore 64) is a high resolution display, with an extension to 70.45 for the left, and 128.070 for the right. The number represents roughly the approximate in each line ground plane goes and the last ground line.

1040 End the program, some languages will automatically return the screen when the program ends, or the method of ending will occur with the user a ready.

1050 The alternative statement set up

screen or hold the data describing the cube. 777777 holds the co-ordinates of each of the eight corners of the cube. Length holds the size for each of the 12 edges of the cube. End on the screen or subroutines draw on the edge data.

1060-1080

1070-1100

1090

1100

1120

1130-1140

1160-1180

1190-1200

1200-1210

1220-1230

1240-1250

1260

3D theory

It is well known that television pictures only appear to be 3-dimensional, an effect achieved by making more distant objects appear smaller. The program performs a mathematical operation on a given co-ordinate to scale it up or down in size depending on whether it is closer to you or the way. Since we have no device on the arbitrary axis, we assume that the screen has X values going from -100 to 100 inclusive as you distance from left to right, and Y values going from -100 to 100 inclusive as you distance from the top to the bottom of the screen.

The Z values are a little more complicated. The program assumes that when Z is -100 units, the object is right on the surface of your eye — this means the

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4. object appears infinitely large because it is so close. A Z value of zero is taken to mean the surface of the screen itself. Hence if you draw a rectangle with co-ordinates at (-100, -100, 0), (-100, 100, 0), (100, 100, 0) and (100, 0, 0), or then it will correctly fill the screen. Lastly, as the positive Z values become larger eg. 100, 200, 300, 400 etc, the object will become smaller and appear to recede from view. Drawing a cube at a distance of 10000 units will produce no more than a point.

Now, all we need to do is to devise a formula for correcting co-ordinates depending on their distance. It is surprisingly easy to produce an approximate formula with sufficient accuracy for our purposes, assuming that the size is dependent on the Z value, as find that a co-ordinate with the prefix (X, Y, Z) has an apparent screen position of:

$$X/Z \text{ (for } X > 0 \text{) ; } Y/Z \text{ (for } Y > 0 \text{)}$$

A glance back at the formula shows several points. Firstly, we have converted a 3-dimensional point (X, Y, Z) into a 2-dimensional point (X/Z, Y/Z) for the TV screen. So, really, the correction is achieved simply by multiplying by a factor dependent on Z, namely $100/(Z+1)$. When Z is -100 the apparent position is 500% which means all points are magnified 500 times, because they are so close. When Z is zero, the apparent size is 100% - 1, and hence all points appear normal size. Finally,

as Z increases to (say) +500, the evaluation gives $100/(500+1) = 0.2$, ie all points are half size, and so on.

The simple expression is the one used to scale the co-ordinates in the program and, owing to its frequent use, is defined as a BASIC function to line 1240. The actual statement for drawing a 3-D box was 3-D boxed at line 1240. Note that the addition of +1 (400 or +100 in the values) is to constrain the origin (the normal screen is 320 x 200) and to define centre of the screen as at (160,100).

We now have the ability to describe any line as 3-D. By making the two end points of the line to be the same, we can plot a single point. All we need now is something to draw. This is provided by the accompanying program as it draws a cube moving through space.

Two forms of motion are incorporated. The first is that the cube is moving away from you. This movement is controlled by line 1000 which sets up the value LOC which ranges from -50 to 500, and is the Z value of the centre of the cube and line 1200 and 1260. As LOC increases, the cube is supposed to move away. This is done in the latter two lines by adding LOC to the normal value of the Z value of each corner.

The second form of motion is that the cube is rotating around one of its corners. Actually, the corners of the cube are rotated around the one. The program as listed will make the cube appear to rotate in a clock-

wise direction, with the actual change in angle given by line 1240. If you make ANG in the line negative, the cube will rotate in the opposite direction. Similarly, if ANG is set to zero, the cube will not rotate at all. You may like to observe how the cube appears if a corner is moved other than. Try replacing line 1240-1270 inclusive with one of the following alternatives:

```

1240 Y=PT(X,Z)
1250 PT(X,Z)=X-INT(PT(X,Z)/LOC)
1260 ANG=COS(PT(X,Z)/ANG)+0.5
1270 PT(X,Z)=X+INT(PT(X,Z)/ANG)-PT(X,Z)/COS(ANG)+0.5

1240 Y=PT(X,Z)
1250 PT(X,Z)=X-INT(PT(X,Z)/LOC)
1260 ANG=COS(PT(X,Z)/ANG)+0.5
1270 PT(X,Z)=X+INT(PT(X,Z)/ANG)-PT(X,Z)/COS(ANG)+0.5

```

Each of these alternatives will produce a different type of motion. For extra effect, by combining two motions (first perform one rotation, then perform the next, and so on.)

Hopefully, you should now have enough material to try a few experiments for your self. Even if you do not understand all of the theory, you can see that 3-D effects can be achieved fairly quickly. If you're allowing small sections of the program - consist mainly on the lines mentioned in the text - you will see what effect they have on the display as a program. ■

```

1000 REM 3-D GRAPHICS ROUTINES.
1010
1020 REM BY A. WATSON
1030
1040 SCREEN 1250
1050 FOR LOC=-50 TO 500 STEP 25
1060 GOTO 1120
1070 FOR ANG=0 TO 360
1080 SCREEN 1250
1090 GOTO 1140
1100 NEXT LOC
1110
1120 REM INITIALIZATION
1130 DIM P(100,0),L(11,2),C(11,2)
1140 FOR I=1 TO 10
1150 READ P(I,0),L(I,1),L(I,2),C(I,1)
1160 NEXT I
1170 FOR I=1 TO 10
1180 READ L(I,0),L(I,1),L(I,2),C(I,1)
1190 NEXT I
1200 FOR I=0 TO 0
1210 FOR J=0 TO 0
1220 POINT (C(I,J)+300)/(1000+LOC)
1230 GOTO 1240
1240 REM DRAW
1250
1260 FOR I=1 TO 12
1270 FOR J=1 TO 12
1280 DATA 111+140,120+100,1
1290 GOTO 1240
1300
1310 REM DRAW
1320 FOR I=1 TO 12
1330 I1=PT(X,I,LOC),I2,I3
1340 I4=PT(X,I,LOC),I3,I2
1350 I5=PT(X,I,LOC),I2,I1+LOC
1360 I6=PT(X,I,LOC),I1,I2+10
1370 I7=PT(X,I,LOC),I1,I2+10
1380 I8=PT(X,I,LOC),I1,I2+10
1390 GOTO 1240
1400 NEXT I
1410 RETURN
1420
1430 REM DRAW
1440 FOR I=1 TO 10
1450 PT(X,I,1)=INT(PT(X,I,1)+COS(ANG)-PT(X,I,1)/COS(ANG)+0.5)
1470 PT(X,I,2)=INT(PT(X,I,2)+SIN(ANG)+PT(X,I,2)
1480 NEXT I
1490 RETURN
1500
1510 DATA 1,2
1520 DATA 2,3
1530 DATA 3,4
1540 DATA 4,5
1550 DATA 1,2
1560 DATA 2,4
1570 DATA 3,7
1580 DATA 4,8
1590 DATA 5,7
1600 DATA 7,8
1710 DATA 8,3
1720
1730 REM END
1740 FOR I=0 TO 0,11
1750 NEXT I
1760 IF INKEY$="" THEN GOTO 1750
1770 FOR I=0 TO 0
1780 NEXT I
1790 END
1800
1810 END

```



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It's a game that involves real skill because you must move your joystick to simulate peddling action. You must get through the gates of the slalom course in the fastest time possible, while avoiding the river bank and rocks. There are also extra hazards like rogue speed boats and interfering beavers to worry about.

The main level game features increasingly difficult river courses with superb graphics and smooth scrolling along the river. Qualifying times have to be reached to move onto the next course.

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I am the music man, I come from down your way

David Fox takes a trip down melody lane with a review of *MusicCals*

HAVING mentioned *MusicCals* in previous articles on Commodore 64 music, it seems appropriate to take a closer look now, since UK distribution seems well established and additions to the original range are on the way.

The 64's powerful 512K (shared) interface Device chip gives it the capability of making music comparable to many dedicated music synthesizers, and since there are three special channels you can also play chords. The 64's huge memory also means that it has the capability to store huge amounts of note information as DATA statements.

The big problem is in accessing all this power through Basic, since many separate POKEYs are needed to fully set a sound register, it's a formidable task to get even a loop out of the 64. It's much wiser to forget Basic and go for one of the many sound synthesis packages now available, of which the most powerful is *MusicCals*.

MusicCals is distributed only, and is intended to be an open-ended suite of programs which can be revised, updated and expanded by future packages. Musically, there are also plans to incorporate hardware and interface dedicated musical instruments.

MusicCals comes from Waveform of

California, and so far consists of three main programs plus two "templates", the function of which will become clear.

MusicCals 1, *Synthesizer* and *Sequencer*, costs £41. On loading you are presented with a screen display showing all the available sound parameters. Using a cursor of bar graphs and keys, all the parameters — waveform, ADSR, frequency, channel and so on — can be individually controlled for the three voices.

Synchronized score

On the right of the display is a colourful grid with moving squares which synchronizes with the notes currently playing.

On loading there are actually 32 score presets as preset files. These range from rock to classical, Latin American, country and so on. Scores are selected from the keyboard, as are the 32 "sound sets" — combinations of different voice settings. In other words there are 1024 combinations of voice and sound available on loading, which can be altered as you wish, set down to lower lines for use as backing music, or erased and replaced entirely.

The display also monitored rather better than most of these demo files the first release being *Rock 1* and *1.01's American*

Hoodoo to see the American idea of Rock and Latin American is pretty laughable, but at least the demos are a good basis to work on.

MusicCals has an unique ability, which will look at it later. The first is sound synthesis, which is carried out straightforwardly with keys used to toggle switches or combinations.

Secondly, composition is carried out on the three channels, in which an enlarged version of the synthesized tone on the main screen represents the note positions for each of the three voices throughout the composition. Scores are written using the cursor to place blocks on the grid, using long notes and rests for each one and adjusting tempo appropriately.

The third function is playing from the keyboard. It's impossible to overcome the obvious difficulties in playing in this manner, but the addition of a mechanical score keyboard is a far more possible. The *MusicCals 1* package *Keyboard Maker* (which can only be used in conjunction with *MusicCals 1*) can be used to define any keyboard parameters and to set successive sound notes — great for Stockhausen fans.

The fourth function of the *MusicCals 1* package is to select demo scores or load templates. There is previous info information on the next section on how to go about this, and I would hope that the link would be corrected before *MusicCals* has the shop.

**"There are
1024 com-
binations"**

The fifth function is the storage of sound/voice sets to a blank disk, which means of course that real templates can be created for performance or modification at any time.

The last function — and possibly the most exciting one, as the ability to call in other programs to work with *MusicCals 1*.

Again there is an incredible lack of detail in the manual with which I was provided.



The MusCalc 2 package, for instance, has the ability to print out musical notes (given a suitable printer), and allows MusCalc to be interfaced with drum machines such as the ubiquitous Roland TR 609 Drummer (see how!) There are also basic drum effects such as digital delays can be used in MusCalc 2 costs £20, as does MusCalc 3

The releases are £15 each, and the new one is the most in The Best File, a set of drum rhythms ranging from rock to swing.

So MusCalc is an incredibly powerful system, totally open-ended and capable of allowing composition, music editing and sound synthesis with no necessity for

musical training or expensive dedicated equipment.

The main problem at the moment seems to be with the manuals, which are very full and detailed in most places but seem to miss out on some areas altogether. Let's hope the situation is rectified.

Limitless future

The future of MusCalc is virtually limitless. Although the two American keyboards are slow at the Park International Commodore Show in June are unlikely to be imported due to prohibitive shipping costs. MusCalc UK hopes to produce a keyboard for around £20

There's no indication yet whether this will be a full mechanical type or a touch-type.

Other projects include a cartridge version of MusCalc 1, more synthesizers, and, most importantly, a MIDI interface.

As explained in previous articles, MIDI is a standard which has been adopted by all the major synthesizer manufacturers, allowing notes, drum machines and sequencers to exchange notes and pitch information. There are already sequencers and software available from SIEE, Sequential Circuits and Yamaha, allowing the 88 to control MIDI-based equipment, and the prospect for a MIDI version of MusCalc are very exciting. Plans are also afoot to allow the 88 to be connected together, presumably controlled by a mechanical keyboard in MIDI mode, allowing an entire computer polyphony.

As the nearest MusCalc is available must order from MusCalc UK, The Pavilion Group, The Metropolitan, Bedford Road, London NE1, 01-241 2448. Retail outlets are being developed, although MusCalc UK feels that a shop environment is perhaps not the best place to get the full of the system's possibilities. Admittedly the MusCalc 88 is as powerful as it would take hours to get a full demo — but even the brother here will thank you over Electronic Soundmaster & Computer Music, a monthly magazine available from all good newsagents, will be carrying an entire page including a MusCalc demo in a forthcoming issue. Watch out for it. — MusCalc is well worth hearing. ■



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ADS's filters, waveforms and resonance — David Fox discovers how easy it is to bust out a tune with Commodore's budget performance package, the remarkable Music Maker

REASONING AT a remarkably late date that many 64 users want to do more with their machines than splash slots, Commodore has—in conjunction with the UK's biggest music publishers, Music Sales, come up with the Music Maker system.

It allows you to use your music as a musical instrument, without the disadvantages of typing or using alphanumeric through the QWERTY keyboard, as you start with most of the available music composition software packages (see Commodore Workshop May issue). At the same time you don't have to spend money on a full-size mechanical music keyboard, such as the \$150 Kake 1 or the \$225 Anzuphonic Microsound 64.

The Music Maker is cheap, easy to use and fun, and should sell in its thousands, especially if it gets into the shops in large quantities as now for Christmas. Basically, it uses the facilities of the 64's Sound Basic Free Device — the SID chip — to turn the music into a musical instrument, comparable in cost to the cheaper Casio home keyboards.

Keyboard

The main feature of the Music Maker system is the cheap mechanical keyboard, which sits over the top row of the 64 and mechanically depresses the QWERTY keys when pressed. Also included in the package is a set of stickers, which correspond to musical notes and to real key labels (octave, a music book, one of the 25K slots from Music Sales, and software on disk or tape).

The software, developed by Richard Wash of Music System Music, gives the 64 many of the capabilities of the extremely popular Casio VL-Tone. In the main menu, the function keys can be used to control rhythm speed, which gives a choice of four backing rhythms (contours, tempo, bass line, poly play), which gives three-note chords, and notes quality, which allows most of the facilities of the SID chip to be used to define new sounds.

There is a useful performance feature, known as real timekeepers, by which the pitch of the notes played can be held by pressing on the spacebar. Unfortunately it doesn't seem to work in poly mode or

also-downwards-pitchbend.

In Voice Modify mode, the four envelope parameters can be changed with simple use of the function keys: Attack, Decay, Sustain and Release — the main menu describes the "sound shape" of a note, the way it fades in, holds at a certain level, then fades out again — can be set from 0 to 10. Waveform controls, though, pulse or notes can then be set — they control the sound quality, whether it's sine, dull, low, or in the case of some strictly a wide-harmonic sound.

Pulse width can then be selected in the case of the pulse waveforms, which gives further control over the sound quality. Filtering — the selection of low or high frequencies to be retained or removed from the sound — is then selected, as a resonance, the "hardness" or power of the filter.

Popular

Having on your chord board you can enter a tune with one finger, provide to someone in the company of the score. The 25K menu books give many examples of popular tunes, but subscribers of "popular" are subjective. Elton Presley's Wooden Heart may be some people's idea of rock, but give the Music Maker's Beverly's Blues any time.

Having defined the notes you can start

the tuning by tapping any key in the correct rhythm. The complete tune can then be played back in perfect timing.

Notes or tunes can be saved to tape or disk and recalled at any time, and there are three demonstration tunes included in the software: Gough, Sam Walks, and, probably, "When I'm 64".

It's very easy to see that there's a tuning facility included in the software, you can tune the 64 to a piano, guitar or any instrument. The reason could then be used as a primitive sequencer to drive machines, or as a filter or polyphony of a pitch.

The handbook gives some useful suggestions for sound effects, and incorporates guidance on updating post 64's need to a 16-bit system, an excellent idea if you mean to use the system at all seriously.

Though the Music Maker system is fun to itself, there are a couple of reservations. The two-row keyboard seems a little fragile, though production models will probably be more robust. There's also no provision for mechanical sounds, though a future software package, Pro-Tyke, should make full use of the capabilities of the SID chip available including modulation, voice, sequenced and so on.

Hardware

Other packages planned include a composition program which will enable musical notes to be placed on a graphic representation of a music staff. The package should also allow composition to be printed out, in the same way that Wordstar's MiniCalc 2 package does.

In fact the Music Maker system should eventually associate Wordstar's more expensive MiniCalc suite of programs. With the usual Music Maker package costing only £29.95, it seems certain that many budding computer musicians will feel that the ideal introduction to the field — and with increasing help of further Commodore music hardware, perhaps even a MIDI interface which will allow professional-standard synthesizers to be connected to the 64, Commodore holds out the promise of a happy future for musical 64 owners. ■



Music Maker — good, fast, and more to come



How to teach your Micro a thing or two

Thousands of home computer owners have yet to discover their microcomputer's potential to help with many of the problems and decisions that come up every day in the home or office.

Perhaps you have always promised yourself that you would teach yourself programming, but have been put off by manuals which seem to assume a lifetime spent studying computer science and mathematics. Maybe you have looked at other computer books, but have yet to find one which is free of unnecessary jargon or where the program examples bear some relevance to real life and not space invaders.

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This month's special offer, which is only open to Commodore Horizons readers, features five programs for the Commodore 64 from Supersoft!

Free Zoom Monitor

Mikro Assembler

This program enables you to write assembler source code as easily as Basic. Written by Andrew Tread, it comes with a full screen editor, a three pass assembler and can be used with tape or disk. A five Zoom monitor code manual (worth £11.50) is included in the package.

Usual price: £57.50
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Musicale
This unique program enables you to write five languages: instrumental piano, jazz, pop, funk, and electronic. Instruments and sounds are chosen with three to six notes while three to six chords are chosen with one number of notes from 12 to 36. All an instrument can be chosen or not. Usual price: £57.50. Discount Club price: £55.00.

Music Master

If you have ever wanted to see your 64 as an electronic music synthesizer, this is the program for you. Envelope, wave form and filter parameters can be defined, which may combination of notes can be played piano, forte. A background music feature contains 34 pre-programmed rhythms and patterns. Music Master, written by Nick Flynn, also enables you to create a variety of special effects including vibrato and phasers. Usual price: £57.50. Discount Club price: £55.00.

Interdictor Pilot

The space flight simulator to end all space flight simulators. Written by Lawrence Marshall (Commodore 800), this program puts you in charge of an Interdictor MK II combat patrol craft. Your mission is to engage and destroy ships of the Interdictor Alliance. Extremely complex and comprehensive. Usual price: £37.95. Discount Club price: £35.45.



Graphics designer

Written entirely in machine code, this program contains a demonstration file complete with a sample character set and spaces. In multi-column mode the number of available colours is doubled, but the number of lines per space is halved. Works from both keyboard and joystick. Usual price: £28.95. Discount Club price: £8.45.

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Flight Simulator II takes to the air

That daring young man in his flying machine Pete Gerrard finds that taking off is a great deal easier than landing

THERE ARE Flight simulators, and there are flight simulators, and so far most of the material that has been produced has looked little more than peering a few buttons, hearing a few engine noises and seeing a couple of dials spin on the screen. A real pilot would be very dismayed by the quality of most flight simulator software currently available.

Again, this is, from the new **Flight Simulator II** is a programme that displays, and everything about the package smacks of a loving care and attention to detail included in the package is a real delight, one program manual, and one further manual concerning itself with flight physics and aircraft control as it applies both to that program and to flying generally. It is only available on disk, due to the complexity of the mass of programs as it takes programs and its screen displays are continuously called up from disk, and the random access that the program couldn't hope to be achieved (using tape). You can play, if that's the right word for a program of this standard, using a combination of keyboard and one or two joysticks, although you can get by using the keyboard alone if you wish.

Further documentation supplied in a separate Three is a flight reference card, telling you what all the main controls do, along with four maps of various airport areas. These cover the Chicago, Seattle, Los Angeles, and New York and Boston areas, listing all the major airports in the vicinity. Finally, the amount of detail that has gone into putting the whole package together is highly commendable.

The only thing that was found to be at fault is a first encounter was an accompanying note, dealing some of the features mentioned in the comprehensive manual that do not, in fact, exist. Since everything else is covered down to the last detail, it seems a shame that such a factor as the effect of wind turbulence has been omitted. However, this is but a minor criticism.

Off the ground

To get off the ground and get the program running requires a good few minutes, during which time you see some really strange displays on screen as various high resolution displays are called up and discarded in favour of others. Throughout the game, the border

continually changes colour whenever any new files are called up, a nice touch, to let you know that the computer's still doing something.

The plane that you are about to pilot is a Piper PA-28-181 Archer II, which is a single engine plane, top speed of around 150 miles per hour, with retractable gear and equipped with a good bit of armament. Apparently, the particular plane was chosen because it has a good performance, but is relatively easy to fly.

Clear the initial few files have loaded, you are asked whether you are using a colour or black and white monitor (colour displays are preferred according to which is an option), and then whether you wish to go into some flight mode or use Flight Editor way you can map the program proper, and you start to actually do a few things with the plane.

You start off in Mega Field airport in Chicago, a small airport surrounded by Lake Michigan. The on-screen display is basically split up into two sections, the bottom half displaying the control panel, while the top half is reserved for a radial colour of the appropriate engine is chosen. Next dimensional display of what you're

wing out of the base of the craft. The display can be altered or give you a view 90 degrees to the left or right, and also a view of what's going on behind you.

Also, at this point in the game before we actually get off the ground, many other possibilities and options can be chosen and viewed, by entering what is referred to as the editor. Here, such factors as environment, wind speed, steering system, difficulty of flight (whether you have a serious plane, or a more realistic one), vision, and so on, can all be readily altered.

There is a further (very large) subprogram within the main set, which runs the program from being a flight simulator into a World War I fighting game, but more of that later. For now, let's get off the ground.

For now, you really do get the feeling that you are actually sitting in a plane on a runway, leaning forward (about) as the throttle is opened up and you raise the elevator a little (the sound that you hear changes accordingly), the view from the front of the aircraft gradually changes, and the control panel in front of you fades into life.

After a few seconds, the engine moment arrives when you become nervous, and you rapidly realize that you haven't read the manual properly and don't know what on earth is going on if you're doing. This is quite an alarming feeling, because the package is so realistic. One of the aids, the control panel shows speed, altitude, artificial horizon, slip indicator and turn indicator.

Altering the rubber, aluminum, brass and flap cover produces a colorful, and

with a self-activated count the machine guns on the simple word "Fire!" indicates that you've had a few problems here, unlike real life, as you simply start off again.

After a few more experiments which usually result in similar disasters, you slowly begin to get the hang of the thing, and attempt something a bit more serious: a flight to another airport. Don't keep too adventurous at first, I selected nearby Verdunville County, which seemed like a fairly straightforward flight. Before take off, you are well advised to consult the map for information on the place you're going to try and get to, since this gives you a wealth of useful information about it, including (of course) where it is in relation to you, in terms of co-ordinates and altitude.

Unsuccessful Flights

After a few unsuccessful flights like this, as landing is about the most difficult part of flying (well, landing successfully is either a real life or using such a realistic simulator as this, you can get more daring and attempt longer flights). The program, after all, is supposed to cope with the whole world, and although you've only got two fuel tanks on board you can also easily land and refuel on route to your destination. Landing at some of the more famous airports produces some startling three-dimensional displays (the Bay of Liberty), and throughout I was just so impressed, and so concerned, about the whole thing.

The World War I fighting version mentioned earlier is probably best attempted after a good few hours' therapy.

Because a career in the cockpit is not going to stand much chance of being worked. Here we have the beautiful three-dimensional view out of the front window, for one of two things have changed. Your radar will now show enemy planes approaching, and give some indication of their relative position and altitude. The plane is now equipped with machine guns, and the sights in the corner of the visual display record what you're aiming at as the aim in my case, usually a movement of two, but I did manage one or two enemy.

Your mission here is to destroy the enemy, and outmaneuver their base. On one side of a river lies the enemy, on the other side you have your own base, and it's a good idea to have a score before declaring open warfare, as this gives you the chance of finding out where everything is.

There is so much that one could say about a set of programs as good as this, that it would take an entire magazine to do justice to it. Professional pilots have said that they reckon it to be about the best simulator they've ever seen, and although I've never flown a plane in my life (and never will after the disaster mentioned while trying to get the hang of that), I would have to agree. The review copy was supplied by the 64 Supplies Company of PO Box 19, Widdowville, Kent, which markets Flight Simulator II at £29.

Everything that a pilot would expect to find in a home simulator, and anybody who has been disillusioned about flight simulators in the past should buy this. If you want something different, and don't mind spending a few more holiday flying planes in the luxury of your front room, then buy it. It's brilliant. ■



Hideous Bill is back — in Steve Lee's RATWHACK



VIRGIN GAMES has been accused by more than a pair here, and has returned from a brief, but not a long, hiatus into a vengeance with a hot reputation and a great line-up of games.

Virgin's next programmer Steve Lee has written *Hideous Bill in Rat Whack* specially for Commodore 64/65. Though it's only when he's written so basic, he hatched this one out in a few hours. — "You could enhance it by adding more sprites to enhance *Hideous Bill* and the only Atari item that the game has most of the elements of a commercial game, sound effects, skill levels and progressively more

difficulties."

You must guide *Hideous Bill* through the maze of deadly scurrying rat whoppers, or simply on the rats which scurry from one direction to another. The game requires a joystick in port one, but the *Mouse Man* routine at 4400-4409 could be changed to read the keyboard.

Variables include RD, rat direction; T, test for dead rat; CM, pixel counter; DM, direction of pixel movement; SC, score; and LV, lives.

Read the issue's profile of Steve for some background on *Hideous Bill* and Steve's other programs for *Virgin*. ■

```

R PRINT:####          RAT WHACK (C) STEVE LEE 1984
100 GO#10+PO#0:DO#0#4100
110 GO#10+0000
120 GO#10+0000
130 GO#10+0000
140 GO#10+0000
150 GO#10+0000
200 ROT0110
4000 REM PROGRESSION
4010 V=INT(50#RND*0)
4020 IF=0THEN#1001:00T0+000
4030 IF=1THEN#1201:00T0+000
4040 IF=2THEN#1011:00T0+000
4050 IF=3THEN#1401:00T0+000
4060 IF=4THEN#1701
4070 V=INT(20#RND*0)
4080 Z=INT(20#RND*0)+70
4090 FORV=1 TO Z
4099 RETURN
4100 REM RESET GAME
4110 PRINT:####          PRESS F0R0 TO PLAY
4120 V=PEEK(56320):IF V#0THEN#100
4130 SC=0, LV=0
4140 DO#10+000:DO#0#4100:DO#10+000:DO#0#4100
4190 RETURN
4200 REM CHECK FOR NEW SH0 COLL'N
4210 V=PEEK(56370)
4220 IF V#0 THEN#0THEN#000
  
```



Continued on page 14


```

4559 RETURN
4700 REM START NEW RUN
4710 IF PEEK(25525) = 144 THEN POK=25525, 228:GOTO4730
4720 POK=25525, 50
4730 IF PEEK(25525) = 214 THEN POK=25525, 30:POK=25525, 131:POK=25525, 252:GOTO4750
4740 REM POK=25525, 50:POK=25525, 44:POK=25525, 223
4750 RETURN
4800 REM MOVE RAM FROM J.S. PORT 1
4810 FOR=2701
4820 AND=25525, 255
4830 OR=25525, 255 THEN=OR
4840 OR=25525, 255:GOTO4860
4850 OR=25525, 255 THEN=OR
4860 OR=25525, 255:GOTO4880
4870 OR=25525, 255 THEN=OR
4880 OR=25525, 255:GOTO4900
4890 OR=25525, 255 THEN=OR
4900 OR=25525, 255:GOTO4920
4910 OR=25525, 255 THEN=OR
4920 OR=25525, 255:GOTO4940
4930 OR=25525, 255 THEN=OR
4940 OR=25525, 255:GOTO4960
4950 OR=25525, 255 THEN=OR
4960 OR=25525, 255:GOTO4980
4970 OR=25525, 255 THEN=OR
4980 OR=25525, 255:GOTO5000
4990 OR=25525, 255 THEN=OR
5000 RETURN
5010 REM GET SPIKE DATA
5010 FOR=2701
5020 READ:POK=25525, 255:GOTO5040
5030 REM SET UP VIDEO CHIP
5040 FOR=2701
5050 READ:IF=255 THEN=40
5060 POK=25525, 40
5070 POK=25525, 40
5080 NEXT
5090 REM WRITE POINTERS
5090 POK=25525, 255:POK=25525, 254:POK=25525, 254:POK=25525, 254:POK=25525, 254
5100 POK=25525, 255:POK=25525, 252
5110 REM SOUND DATA
5110 FOR=2701:POK=25525, 255:GOTO5130
5120 RETURN
5130 REM OUT RIGHT DATA
5130 DATA 0,0,0,0,0,0,0,0
5140 DATA 0,0,0,0,0,0,0,0
5150 DATA 0,0,0,0,0,0,0,0
5160 DATA 120,0,120,120,121,120,90,250
5170 DATA 20,17,200,170,10,200,10
5180 DATA 190,200,0,190,24,0,99,0
5190 DATA 0,0,0,0,0,0,0,0
5200 DATA 0,0,0,0,0,0,0,0
5210 REM IN LEFT DATA
5210 DATA 0,0,0,0,0,0,0,0
5220 DATA 0,0,0,0,0,0,0,0
5230 DATA 0,0,0,0,0,0,0,0
5240 DATA 0,0,1,1,100,1,7,191
5250 DATA 17,200,200,21,200,272,0
5260 DATA 120,170,20,90,90,0,190,0
5270 DATA 0,0,0,0,0,0,0,0
5280 DATA 0,0,0,0,0,0,0,0
5290 REM IN DATA
5300 DATA 0,0,0,0,0,0,0,0
5310 DATA 0,0,0,0,0,0,0,0

```



9229 SAT-148, 8, 19, 78, 8, 284, 182, 8
 9230 SAT-224, 24, 8, 191, 208, 8, 232, 122
 9240 SAT-8, 221, 186, 8, 219, 218, 8, 219
 9250 SAT-218, 8, 219, 218, 8, 219, 218, 8
 9260 SAT-219, 218, 8, 219, 218, 8, 219, 218
 9270 SAT-8, 122, 228, 8, 31, 248, 8, 8
 9299 PFM Nam DATA
 9300 DAT-8, 84, 8, 8, 84, 8, 1, 84
 9310 DAT-8, 8, 184, 8, 3, 248, 8, 8
 9320 SAT-252, 8, 12, 28, 8, 4, 88, 8
 9330 SAT-8, 88, 8, 1, 88, 44, 8, 88
 9340 DAT-8, 8, 28, 192, 8, 88, 8, 8
 9350 SAT-48, 8, 3, 188, 8, 3, 188, 8
 9360 SAT-2, 8, 8, 3, 8, 8, 8, 8
 9370 DAT-8, 12, 8, 8, 28, 8, 8
 9400 PFM VIDEO CHIP DATA
 9410 SAT-28, 48, 28, 27, 88, 48, 87, 22
 9420 SAT-258, 228, 24, 88, 8, 8, 8
 9430 SAT-12, 228, 288, 288, 258, 83, 288, 288
 9440 SAT-8, 288, 288, 288, 8, 18, 258, 8, 8
 9450 SAT-8, 18, 8, 8, 8, 14, 7, 18
 9460 SAT-8, 18, 18, 14, 18, 8, 8, 18
 9500 PFM SOUND CHIP DATA
 9510 SAT-8, 78, 8, 8, 8, 78, 8
 9520 SAT-8, 8, 8, 8, 28, 28, 8
 9530 SAT-8, 8, 8, 32, 112, 248
 9540 SAT-8, 8, 8, 18



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Commodore's Christmas presents



As a Christmas bonus, Commodore UK is offering a Plus/4 and a C16 as prizes in this special competition.

You'll all have read the reviews of Commodore's two fabulous new home computers. The Plus/4, with its feature software and compatibility with a wide range of Commodore peripherals, is the ideal home applications machine — and

the C16, with its spectacular graphics and easy programming language, is the best introduction to computing, as well as being a powerful game machine.

To win, all you have to do is put in order of merit the various features of the new machines. (For instance, if you think the most important feature is "Easy programming", then enter C in box One

Then fill in the remainder in an appropriate manner as follows: words or less, and give your entry to the competition address. If you do not wish to cut your copy of Commodore Horizons, photographs or even plain paper copies will be accepted.

Usual competition rules apply. The Editor's judgement is final.

- A:** Advanced 7501 microprocessor
- B:** Full size, full stroke Mechanical keyboard
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- D:** 320x200 pixel screen resolution
- E:** 721 combinations of colour and luminance level
- F:** Help key to highlight programming errors
- G:** Two joystick ports for games and utilities
- H:** Built-in machine language monitor

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ing to make sure that the expression $ABS(A - INT(A/3))$, which has the effect of making the mark for each one bigger than the rest. To understand the expression, you need to know something about the way in which logical conditions are created by the CIB.

When the CIB's BASIC Interpreter, the master machine code program which runs BASIC for you, comes across a condition following an IF, something like $A \leq B$, $A < B$ or $A <= B$ it needs to determine whether that condition is true or false before deciding whether to carry out the action specified by the IF statement. These are all three simple tests.

It will assign a value of A/B as true (eg $A = 10$ and $B = 9$) and assign 0 if it fails (eg $A = 9$ and $B = 10$). In order to make no decision, the condition is evaluated according to the correct values of A and B for which variables have been specified and the condition is given a value which is false, one if the condition is true and zero if it, condition is false. It is the value rather than the condition itself that matters, a fact which you can demonstrate for yourself by considering the following small test. Note, in direct mode.

```
1-STARTING
2-THEN PRINT TRUE
3-THEN PRINT TRUE
```

The result will be that TRUE is printed on the screen each time the value following the IF statement is not zero (any non-zero value, positive or negative, will produce the same effect). Now try

```
1-STARTING
2-IF THEN PRINT TRUE
3-THEN PRINT TRUE
```

Module 2.1.4 Lines 1000-1200

```
1000 REM *****
1010 REM DRAW GRAPH
1020 REM *****
1030 REM *****
1040 REM *****
1050 REM *****
1060 REM *****
1070 REM *****
1080 REM *****
1090 REM *****
1100 REM *****
1110 REM *****
1120 REM *****
1130 REM *****
1140 REM *****
1150 REM *****
1160 REM *****
1170 REM *****
1180 REM *****
1190 REM *****
1200 REM *****
```

This time, nothing will be printed on the screen. At the bottom, however, we need to make adjustments to the program. If you are in the way you should see something, or try the following

```
1-STARTING
2-STARTING
3-STARTING
4-STARTING
```

What you should see is -1, the value of a line condition. Now try

```
1-STARTING
2-STARTING
3-STARTING
4-STARTING
```

The result now will be 0, since the condition is not true. At first this may seem interesting but moderately irrelevant. In fact, the ability to extract a value from a logical condition is of great value in programming, as line 1140 illustrates.

What line 1140 does is to draw a series of lines at right angles to the vertical axis to mark the divisions specified by the user. The length of these lines is normally four

Module 2.1.3: Lines 1000-1200

```
1000 REM *****
1010 REM DRAW GRAPH
1020 REM *****
1030 REM *****
1040 REM *****
1050 REM *****
1060 REM *****
1070 REM *****
1080 REM *****
1090 REM *****
1100 REM *****
1110 REM *****
1120 REM *****
1130 REM *****
1140 REM *****
1150 REM *****
1160 REM *****
1170 REM *****
1180 REM *****
1190 REM *****
1200 REM *****
```

pixels. However, whenever the value of the loop variable I is exactly divisible by five (ie every fifth mark) the condition $(I/5 - INT(I/5))$ will be true and will take on the value minus one rather than zero. In other words, including $(I/5 - INT(I/5))$ in the line which specifies the length of the mark is to DRAWN, allows every fifth mark to be doubled in length without the use of a complex IF THEN ELSE statement.

Now that to add four to the length of the mark, we have to take away four times the value of the condition, since the value when true is minus one - taking away a minus number is equivalent to adding a positive one.

Line 1140-1150. Exactly the same process is carried out for the horizontal axis. Note that here, the small marks are drawn upwards from the axis and so occur from position 180 to position 174 down the screen. To increase the length of the mark, the 174 has to be reduced to 172, and this is done by adding four times the value of the loop condition.

Line 1190. The number of units represented by each division on the vertical axis is read from the DATA statement.

Testing

To test this part of the program, all that is necessary is to RUN the program as far. You should see the graph and draw on the screen with TEST at the top. VERTICAL, down the left-hand side, and HORIZONTAL along the bottom. The two axes should be neatly divided up into 20 units each.

Note. At the end of this test you will be left in high resolution mode. There is no need to use a function key to produce

CRASHESC and just go on to try to type in CRASHESC until you get back to the test screen. Simply press any letter key (not a number), followed by RETURN. This will generate a system error which automatically returns you to the resolution. This simple technique will save you a great deal of time in the future.

Module 2.1.4 draws the graph itself, using the information specified in the DATA module (Module 2.1.2).

Commentary

Line 1000 and 1090-1095. Pressing STOP at any time during the main drawing sequence, or pressing any key once the graph has been drawn, returns the CIB to low resolution and lists out the data on which the graph is based. This makes examining and changing the graph extremely easy.

Line 1095. COLUMN will be used to reset the position of an item of data along the horizontal axis.

Line 1097. Two items of DATA are picked up. The reason that two are READ before the main loop is that the graph can only be begun if there is a place to draw from and a place to draw to.

Line 1099. On each pass through the loop, a new line will only be drawn if there is a valid coordinate for it to be drawn to - rather than the ENDY bottom.

Line 1110-1115. These lines define the two points between which one point on the graph will be drawn. The X, or horizontal, co-ordinates are calculated by multiplying COLUMN (the number of units the graph has progressed along) by horizontal units (LH) the length in pixels of the horizontal axis (LH). The constant 20 is the distance from the start of the horizontal axis to mark from the left of the screen.

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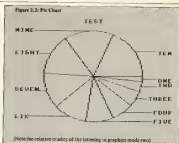
4 The Y or vertical, co-ordinates are slightly more complex. Starting from the bottom of the bottom end of the axis, which is 100 pixels down the screen, the value of the DATA item is first divided by LIMIT. Thus if the DATA item was 1,000,000 and the user had specified that the vertical axis was to be divided into units of 100,000, (LIMIT = 100,000), then the result would be 1,000,000/100,000 or 10 units. Having arrived at the number of units, this is then multiplied by the length in pixels of the vertical axis (255). The figure arrived at is subtracted from 100 since the screen is numbered from zero at the top.

Line 100 Each time a single line is drawn on the graph, its end point becomes the start point for the next line. If the screen contains DATA however, the following line will overwrite the existence of the loop.

Trying

RUN the finished program and you should see a smooth, bell shaped curve drawn. When drawing is finished, press any key and you should see the DATA module level over the screen so that you can alter them at will.

One very useful way of presenting small amounts of data is the pie chart technique, where a circle is broken up into segments representing the proportion of a total headed over to the different parts which make it up. In the program which follows we shall draw on what we have already learned about the mathematics of circles,



and the flexible use of DATA statements in the last program.

As with the previous high resolution graph, the figures on which the present graph will be based are contained in DATA statements, this time in module 2.2.1 Note, however, that in the program at hand, the two arrays which will be used to hold the names of each item and its value are not

dimensioned, so you are limited to 10 items.

Finally, a pie chart with more than 10 items is of little value, because it becomes too crowded to really take in the information. Even so, you can if you wish include a dimensioning statement at the beginning of the program. If you do include such a statement and increase the number of items, you may find that you have to sleep some of the available hardware, since the program must right up against the limits of memory.

Module 2.2.1 processes the data for the chart. The information contained in the DATA module is read into the variables NAMES and ITEMS, and the arrays NAMES and A.

Commentary

Lines 900-950 The value of the items to be checked are first added together to discover the total that the circle will represent. The DATA pointer is then RESTORED to the beginning of the quantity figure and each quantity is translated into a second figure which, when divided into 360, would give the same result as the original quantity divided into the total. For instance, if the total were 100, and the quantity for one item were 25, this would be translated into 90, or 25% of 360. These new figures will later be used to determine how large a chunk of the pie chart will be given to each item.

Trying

Enter the following lines from what will eventually be the control module, and then RUN the program.

If all is well, then nothing should happen visibly — only if there is an error of some kind will you see anything. If you wish, however, you can print out the contents of the variables and arrays named in ▶

Module 2.2.1: Lines 4000-4900

```
4000 REM*****
4010 REM DATA FOR CHART
4020 REM*****
4030 DATA TITLE,TEST
4040 DATA NUMBER OF ITEMS,10
4050 DATA NAMES,(ONE,TWO,THREE,FOUR,FIVE,SIX,SEVEN,EIGHT,NINE,TEN)
4060 DATA
4070 DATA QUANTITIES,(1,2,3,4,5,6,7,8,9,10)
4080 DATA
```

Module 2.2.2: Lines 5000-5110

```
5000 REM*****
5010 REM PROCESS DATA
5020 REM*****
5030 RESTORE 4000
5040 READ T,NAMES
5050 READ T,ITEMS
5060 READ T : FOR I=0 TO ITEMS-1 : READ NAME,
5070 : NEXT
5070 RESTORE 4070
5080 SUM=0 : READ T : FOR I=0 TO ITEMS-1 :
5090 READ T : SUM=SUM+T : NEXT
5090 RESTORE 4070
5100 READ T : FOR I=0 TO ITEMS-2 : READ T :
5110 RC1=1-(T/SUM)*360+R(1) : NEXT I
5110 RETURN
```

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4. Use methods just to measure yourself.

Module 2.2.3 sets up the graphics mode and associated colours, and draws an 80°/80 circle on the centre of the screen, together with the name for the chart.

Commentary

Line 2000: The graphics mode we are going to use is a multicolour mode, which will allow us to have three different colours (after the background) on the screen at the same time. The advantage to this is that it makes the chart easier to read than the usual colours. It is possible to have on the screen at any one time, the three colours. It is for the CIB to record the colour of each individual plant, and the more memory it needs.

Since the graphics screen already sets up enough of the memory, when we go into multicolour mode the operating system does a switch-off between colour and standard. This is made three times: the program sets up itself to allow it to actually do anything with will be one pixel down by two pixels across. The screen, so far as the CIB is concerned, will no longer be 128 pixels across but 140, thus leaving memory which can be devoted to remembering the greater range of colours.

From now on, therefore, whenever you look at the X co-ordinates (across the screen) of anything in the program, remember that you need to double it (before it is comparable with the same co-ordinates in previous high resolution programs) as the look which are several high resolutions.

Line 2005: The label expression in the CLEAR statement simply ensures that no matter how long the title given to the chart, it should always look as if it has been printed roughly in the middle of the top line.

Module 2.2.3: Lines 2000-2070

```
2000 REM*****
2010 REM DRAW FRENCHCORK
2020 REM*****
2030 GRAPHIC 3,1
2040 COLOR 0,1 : COLOR 1,2 : COLOR 2,4,4 :
      COLOR 3,6,4
2050 CHAR ,20-LEN(NAME)*1/2,8,NAME$
2060 CIRCLE ,00,100,40,00
2070 RETURN
```

Line 2000: An illustration of the point made earlier about dimensions in multi-colour mode. To make use of the previous and dimensions of this circle, multiply the first and third parameters by two.

Testing

Add the following lines and then RUN the program:
NEW COLIB.LIN
RUN COLIB.LIN
RUN COLIB.LIN

The result should be nothing more exciting than the title given to the chart and a white circle. Press any key except RUN/STOP to get back to the normal screen.

Module 2.2.4 draws up the segments into which the chart will be divided, colours them and attaches the labels specified in the DATA module. In order to understand what is going on, you will need to be able to remember the simple mathematics of a circle.

Commentary

Lines 2008-2010: A series of lines are drawn from the centre of the circle to the

circumference, dividing the circle up into the segments for the chart. The figures used are those calculated in Module 2.2.1.

Lines 2008-2010: The angles at which the segments start are calculated again, but four degrees are added to each to clear the line down by the previous loop, & positions are then calculated on the basis of this angle which is just inside the circumference of the circle. The PAINT command is then used to colour the wedge shaped segments in which the correct points fall.

Line 2009: produces a circle of the three fractional colours specified in Module 2.2.3, except for the last segment, which is left as background colour. This is because it means that the final segment cannot be the same colour as the first. Since they are not, it will catch other lines would make the chart harder to read.

Lines 2010-2015: These two lines calculate an angle half way between the start and finish points of the current segment. It is possible that on moving from the start point to the finish point we will cross the 0°/360 boundary on the circle, producing a nonsense figure — adding 180 results then.

Lines 2016-2018: The figure needed for defining a point in relation to the radius. The reason that the XH and YH values are stored in the variables TX and TY is that the chances are that they are going to be used more than once in a line and there would not be room to spell them out in full.

Line 2016: You will recognize the use of a logical variable here. Its effect is to make DX either zero or 180 according to whether the point defined by TX and TY is to the left or the right of the centre of the circle.

Lines 2017-2018: A line is drawn from the circumference of the circle to the edge of the screen on the left or the right as defined by DX. At the end of the line, or rather near it, is printed the label for the segment to which the line points. The print position for labels on the right hand side is moved to the left so that they do not run off the end of the screen, again using a logical variable.

Testing

Add the following line and RUN the program:
NEW COLIB.LIN

You should see a display like the one in the beginning of the screen for the program, except that it will be in colour rather than plain black and white.

Module 2.2.5 is the control module for

Module 2.2.4: Lines 2008-2100

```
2008 REM*****
2010 REM INHERT SEGMENTS
2020 REM*****
2030 FOR I=0 TO ITEMS-1
2040 P=PI*I/180#4
2050 DRAW ,00,100 TO (0+40*COS(P),100+00*SIN(P)
2060 NEXT I
2070 FOR I=0 TO ITEMS-1
2080 P=PI*I+4/180#4
2090 C0=(1-SIN(PI/2)*I) : IF I=ITEMS-1 THEN C=C0
2100 PRINT CC,(0+32*COS(P),100+70*SIN(P),1
2110 TR=AR(I)+4*(I+1-ITEMS)+ (I=ITEMS-1)/2
2120 IF AR(I)+4*(I+1) THEN TR=TR+100
2130 S=TR,100#4
2140 DR=0+40*COS(P)
2150 TR=100+00*SIN(P)
2160 DR=AR(I)+4*(I+1)-AR(0)
2170 DR=AR(I),TR,TY TO DR,TY
2180 DR=1,DR/4+LEN(NAME)*1/2-1#*DR-150,TY/8,AR(I)
2190 NEXT I
2200 RETURN
```

Most of the lines for this have already been entered, but make sure that you have all the lines listed on the module or you will miss out on two refinements.

Commentary

Lines 1000 and 1020-1026 A level error message to indicate that there is probably an error in the layout of the DATA module — that is not available as a card, since some mistakes will not generate errors detectable by TRAP.

Testing

Change one of the figures under the QUANTITIES heading to a letter, then RUN the program. You should see the program error message and then the DATA module listed on card. Correct the delimiter mistake and RUN the program again. This time pressing RETURN/STOP for any key once the chart is drawn should list out the DATA module.

Having looked at two different means of processing data in high resolution mode, it is now to remind ourselves of the massive flexibility which Commodore's excellent low resolution graphics set provides. Using the low resolution graphics characters not only provides the user with more mode effects which would be extremely difficult to provide in high resolution, it allows the full range of colours to be employed out, so that, from the intensity which would otherwise be tied up in the high resolution screen.

In the final program we shall create a

Module 2.3.1: Lines 1000-1120

```

1000 REM*****
1010 REM CONTROL
1020 REM*****
1030 TRAP 1120
1040 GOSUB 5000
1050 TRAP 1050
1060 GOSUB 2000
1070 GOSUB 3000
1080 GETKEY #K
1090 GRAPHIC 0
1100 SCREEN : LIST 4000-4050
1110 END
1120 PRINT "PROCEEDLY INVEL IDVATYWFQWNY"
1130 FOR I=1 TO 2000 : NEXT : PGLINE 1100

```

three dimensional bar chart whose display, I think, one of the best demonstrations of just how impressive the CIB's low resolution can be — to last the best of display that will have you calling on the family to share them just how often you really are.

Module 2.3.1 looks after the individual unit. It is a straightforward module to describe a small number of variables and arrays.

Commentary

Line 1000 The array III will be used to store the data for the graph since the Figure in the DIM statement must be created from DATA, what is provided here is space for three sets of seven data items.

Line 1060 The string RE will be used as the data file module and explanation can read what that module.

Line 1070 This string is made up of three colour control codes, in characters which, if printed, change the print colour. The three colours, in order, represent yellow, green and purple. Later on, the string will be used to provide flexible changes from one colour to another.

Line 1080 The INPUT is designed to allow a user module to call up a set of data for a graph from disk (or tape).

Module 2.3.2 (which will be printed next month) accepts the data. Since we are working in low resolution, there is no need for us to adopt the use of many DATA statements to store changing information.

Most programs which work on useful information will make provision for the user to input such information while the program is running — such programs are known as interactive. In the case of the present program, all the information can be entered at one time, so what we use is a module which requests information, uses the information to set for mode and performs checks for mistakes in entry.

Commentary

Lines 2000-2040 As with the line graph program, earlier, each single unit on the vertical axis can represent any value specified by the user. Note that because we are working in low resolution we do not have the same flexibility as the previous program in the use of the vertical axis. The only practical way for such units is one character square's height, and the height of the graph will show 20 units on the vertical axis.

Lines 2070-2080 The graph will allow, as mentioned previously, three sets of no more to be generated. They will be displayed in the form of three lines of up to six unit bars. Each line of bars will be called a bank, and the individual bars will be called columns.

The final part of this article will be published next month.

This article is based upon an extract from *The Working CIB to World Lessons 2* is published by Random House and costs \$2.95.

Figure 2.3.1: 3D Graph



HHH

Module 2.3.1: Lines 2000-2090

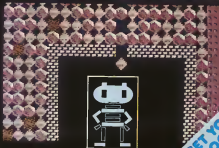
```

2000 REM*****
2010 REM INITIALISE
2020 REM*****
2030 COLOR 0,11 : COLOR 4,10 : LINE# 1
2040 CHRP 1,8,1,"DPVS OADRCDLJGAPH" : PRINT
2050 DIM HHH(3,6)
2060 H#=#CHR$(1,3)
2070 CON#=" IVEL 3CONJICUPJ 3"
2080 INPUT "CBLA JICDILGRYFFQH"QDRKTYV/ HJ" #0
#
2090 RETURN

```

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and look out for the ships of your comrades plunging from the sky. More instructions are included in the program. Use a joystick in Play Game. Collect all the letters and they spell a message, and the game comes to an end.

```

1 REM*****
2 REM LASER ZAP *
3 REM# 5,167841*
4 REMILLUS HOUSE *
5 REM*****
6 REM
7 REM RESIZING CHARACTERS
8 GOSUB1300 DIMT(7): F=650: I=4
9 PRINTOFF#142: F0R52-48 CLR F0R56-48 CLR F0R5634 F0R: 56384+R0G274
10 F0R1 F0R11R0D251 F0R1R0T0511 F0R1+12255 F0R1+52243: NE#T1
11 F0R1 F0R1-1:0R4 F0R256334-F0R1563400R1 F0R15272, OF0R15272R0402490+12
12 F0R1-12255T012255+7 F0R0R F0R1R4 NE#T J=1
13 DATA 255,128,248,252,248,128,225,0
14 F0R1-12735T012735+7 RE#D0R F0R1R6 NE#T5
15 DATA 8,8,3,3,225,127,63,31
16 F0R1-12735T012735+7 RE#R0C F0R1R,CO NE#T6
17 DATA 8,8,192,192,255,254,252,248
18 F0R1R12448+25T012448+38 RE#R0M F0R1R,6M NE#T14
19 DATA 8,68,68,68,68,68,24,24,0
20 F0R1-1274T01274+7 RE#R0D F0R1R,3D NE#T10 F0R1R0R1-8
21 DATA 8,8,68,68,68,68,128,225
22 F0R1-12448T012448 F0R1 L F0R1R,L NE#T
23 DATA 24,24,24,68,68,68,24,0
24 REM INITIALIZE VARIABLES
25 R=1424 R0=55296 Z=1994 Z0=56256 I=1985 I1=56237 D=1942 D0=56214 PRINT"C"
26 DP=1423 F0=55295 DM=1824 TV=55295
27 F0R0R1T048 F0R1R43+0R,185 F0R1 56215+0R,6 NE#T00
28 F0R1,62 F0R1:1
29 F0R1R,8 F0R1R,1
30 PRINT"*****CORE**C PRINT"*****H1-SCORE**C
31 IF F=1THEN200
32 FPU=1THG296
33 FPL=1THG285
34 T=INT(18#R#): IFT>8THG295
35 TT=INT(18#R#(1)): DFTT>7THG285
36 TR=INT(18#R#(1)): DFTR>7THG248
37 RT=INT(18#R#(1)): DFT>6THG295
38 F0=F0R1(56321)
39 IFP=254THG F0R1R,32 F0R1R,1 R0=R0-48 R0=R0-48
40 IFP=246THG F0R1R,32 F0R1R,1 R0=R0-38 R0=R0-38
41 IFP=247THG F0R1R,32 F0R1R,1 R0=R0+1 R0=R0+1
42 IFP=245THG F0R1R,32 F0R1R,1 R0=R0+41 R0=R0+41
43 IFP=253THG F0R1R,32 F0R1R,1 R0=R0+68 R0=R0+68
44 IFP=243THG F0R1R,32 F0R1R,1 R0=R0+39 R0=R0+39
45 IFP=251THG F0R1R,32 F0R1R,1 R0=R0-1 R0=R0-1
46 IFP=249THG F0R1R,32 F0R1R,1 R0=R0-41 R0=R0-41
47 IF F0=233THG I185
48 F0R1,32 F0R1T,1 I=I+1 I1=I1+1 IF I=2823THG I1=1994 I1=56256
49 GOTO 75
50 F0R1,32 F0R1M,1 M=R M=R M=R+48 M=R+48

```

```

187 POKE M,20 POKEM,1
188 IF M=40*THEHH=40 L3=30 GOTO1000
191 IF M=41*OTHEHH=41 L3=40 GOTO1000
193 IF M=40*OTHEHH=40 L3=41 GOTO1000
194 IF M=134*THEHPKEM,32 POKEM,1 F=0 GOTO75
195 F=1 GOTO80
200 M=40 M=M+40
201 IF M=134*THEHPKEM=40,32 POKEM=40,1 M=0 M=0 F=0 GOTO75
202 POKEM=40,32 POKEM=40,1 GOTO187
205 REM MOVE SHIP
210 IF H=OTHEH215
211 GOTO75
215 F=1340 F=56215 H=1
220 POKE0,63 POKE0,1 POKEP,33 POKEPP,1 L3=40*F M=LR=320
221 IF LR=62=40THEH315
222 IF LR=M*THEH225
223 L3=LR=40 GOTO221
225 U=1 GOTO85
230 POKE0,32 POKE0,1 POKEP,32 POKEPP,1
235 O=0-1 O=O+1 P=P-1 P=P+1
240 IF O=138*OTHEH0=1342 O=56214 M=0 U=0 TT=0 GOTO75
245 GOTO220
248 REM MESSAGE
250 K=0 K=K+1
254 IF M=OTHEHFOEEM 32 FOKEV,1 G=0=H,1 T=H*Y,1 GOTO1200
255 IF M=300*THEHTU=25,24 FOK=102*FO18,4+40 FOKP,32 FOKET,1 T=10+1
HEXY GOTO 240
256 IF O=H=1*THEHPURUP 32 FOKED,1 O=1425 F=35335 K=L+ J=J+1,50=50+10
GOTO245
257 FOKDOP,32 FOKEPO,1 L3=40
260 KL=1 GOTO120
265 FOKDOP,32 FOKEPO,1 U=F=0-1 F=0+1 U=1
266 IF U=125*THEHDF=1425 F=35335 K=L+ J=J+1 F1=0 GOTO75
267 GOTO 264
268 FOKEM=K FOKEV,1 G=0=H,1 T=H*Y,1 L=0 GOTO75
280 DATA 1,2,1,1,3,18,399,25,1,14,399,2,23,399,19,399,4,3,22,1,14,3,399,3,12
285 DATA 21,2,329,8,15,21,12,5,399,15,15,8,48,3999
290 EM=1824 TY=55236 RESTORE 29 F=0+5=5000 GOTO2000
292 IF M=41*THEH210
295 L3=1-00 L3=1-000 REM LASER 3AF
300 J3=11-00 FOKY=DLTOL,1 STEP=40 FOKY,20 FOKE B,1 IF Y=0=40THEH300
305 FOK=1TOL,1 FOKY,32 FOKEM,1 J3=J3-40 HEXY
310 J1=0 GOTO75
315 K=P=40 P=P+40 REM FIRE FROM SHIP
320 FOKDF,32 FOKEF,1
325 IF O=H=40*THEH3100
330 F=H=40 F=H=40 GOTO320
335 REM FELLOW SHIPS FALLING DOWN
340 ZH=1195 K2=5537 K2=1122 ZH=55304 L2=1142 ZL=55414 PUT=ZH+000
345 FOKZM,0 FOKM2,1 FOKZR,0 FOK ZH 1 FOK L2,0 FOKZL,1
350 IF ZH=40*THEH3300
355 IF L2=40*THEH3500
360 IF L2=40*THEH3300
365 POKE ZH,30 FOKE K2,1 FOKRZ,32 FOKZM,1 FOKLZ,32 FOKZL,1
370 IF ZH=PUT*THEH2=0 K2=0 L2=0 ZH=0 L2=0 ZL=0 GOTO75
375 ZH=ZH+40 K2=K2+40 K2=K2+40 ZH=ZH+40 L2=L2+40 ZL=ZL+40 GOTO345
1000 FOK M 32 FOKEM,1
1005 FOK M,18 FOKEMH,1
1010 FOKM=1TUS00 NEXTU
1015 FOKM=H 32 FOKEM=H 1 FOKMH,32 FOKM=H,1 U=0 50=50+100 H=0 F=0
1020 F=0 O=1342 O=56214 GOTO75
1100 FOK FF=40,201 FOK FF=40,1 FORT=1TOL00 H=TT
1200 PRINT"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
    PRINT"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
    PRINT"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
1210 GET M# IF M#="Y"THEPRINT"Y" U=0 KL=0 F=0 GOTO1225

```

```

1210 IF HR3="H" THENEND
1220 GOTO1210
1230 IF(CO=H)GOTO1210HR3=SC
1240 SC=O GOTO20
1250 POKE RB,251 POKERC,1 FORTH=1GOTO20 NEXTM GOTO1200
1260 PRINT"*****WELCOME ZEP*"
1270 PRINT"YOU ARE ONE OF THE SURVIVORS FROM"
1280 PRINT"WORLD WAR 3, YOU ARE RECALLED TO BATTLE"
1290 PRINT"AGAINST THE EVIL FORCES LEAD BY TRI-K"
1300 PRINT"YOU HAVE BEEN TOLD TO WATCH OUT FOR THE"
1310 PRINT"ZEPHER AND TO DESTROY THE ENERGY SHIP"
1320 PRINT"YOU HAVE A FLEET OF BOMBS ABOVE YOU AND"
1330 PRINT"IF SHOT DOWN MIGHT COLLIDE INTO YOU AND ALSO CAPTURE THE LETTERS "
1340 PRINT"*****GOOD LUCK!!!!"
1350 PRINT"*****STICK IN PORT 3 OR USE THE KEYS"
1360 PRINT"*****LEFT=BACKWARD  RIGHT=DOWN "
1370 PRINT"*****UP  =FORWARD  DOWN= FIRE "
1380 PRINT"*****PRESS 'S' TO START*"
1390 GET REP OF REP="S" THENPRINT"*****GO!!!" RETURN
1395 GOTO1370
1400 PRINT"*****YOU HAVE SURVIVED YOUR MISSION ELL DONE!"
1410 PRINT"*****BUT NOW YOU MUST CHARGE ON YOUR BATTLE"
1420 FORG00=1GOTO99 NEXTG00 GOTO70

```

Doublor

Andrew Wiley from *Thriller* sends this Vix 20 program.

ANDREW'S program gives double word characters on every letter and symbol on the Vix 20 keyboard.

Once RUN, the program asks 30 words to set up the magnified character set, since there are 3000 numbers to be

printed. You can also RUN the program and use the new character set.

POKE 16415,20 can be used to control the screen, otherwise you may not be able to see the source position. Magna has extremely attractive.

```

10 R=9120 Z=5120
15 Z=PEE-CR+27645
20 POKE Z
30 Z=C+1
40 POKE Z
50 R=R+1 Z=C+1 IF C>765 THEN C=0
60 GOTO15
70 POKE6669+Z55 POKE6667+ZEE<6667+OP1

```

Space Mines

Steve Magler sends this program for the unexpanded Vix 20.

SPACE MINES is a version of Lunar Lander. You must guide your spaceship through the mine by a safe landing, using the joystick. After three safe landings you get a bonus take-off when you score points by ramming the mines and dodging

with your machine ship.

You can use the "Game" key to control the ship if you prefer. Press A or the Fire button to shoot, and increase or extra dangers such as the black mine. Total very carefully.

```

10 PRINT"☐" POKER6679,121
15 PRINT PRINT
20 PRINT"
25 PRINT"
30 PRINT"
35 PRINT"
40 PRINT"*****
45 PRINT"
50 PRINT"
55 PRINT"

```



```

325 PRINT "  "  : GOTO #8007
326 PRINT "  "  : OR JOYSTICK
327 PRINT "  "  : FROM FIRE BUTTON TO #8007
340 PRINT "  "  : OR HIT A KEY AND: FORDY
350 GOTO IF#807 THEN#330
"END OF IT"
:GOTO #800

```

Jellypuss

F. W. Armstrong sends this 100-20 game from Cambridge.

THE OBJECT of Jellypuss is to get your driver safely to the main course.

Working your way up a variety of easy-to-medium courses, and to avoid them you must use the keys A and D to move left and right.

You'll hear a sound effect every time you

reach the course.

Program notes

0: sets sound effects

1: DOSUB to 10-line graphics

2: DOSUB to instructions

3: clears screen, sets score to 0

4: DOSUB to random eating number of

lives you require

100-400, sets up main title

411, music for start of game

440, prints score and lives

470-500, prints five Jellypuss in random

positions

740-760, prints course to random position

760-780, prints drive

790, sets to determine whether drive has

reached bottom of screen

771, sets to see if drive = 0

780-790, moves drive

800-810, tests to see if drive has collided

with Jellypuss

820-830, tests to see if drive has reached

the main

800-8100, sounds go!

You can alter the number of lives allowed

by modifying 3000-3003

```

@ Y1=36075 S=36075
1 GOTO#30000
2 GOTO#30000
3 PRINT "  "  : FORDY=36075+45 SC=0
4 GOTO#30000
540 PRINT
350 FORDY=36075:15 FORDY=36075:150 FORT=100000 NEXT FORDY:GOTO
600 PRINT "  "  : FORDY=36075:150 FPRINT "*****JELLYPUSS*"
610 PRINT "*****" : H=0
620 PRINT "*****" : H=0
630 GET#1:IF#=" " THEN#300
640 PRINT "  "  : FORDY=36075+45 SC=0
650 FORDY=100000 NEXT
660 FORDY=100000:40 FORDY=36075:150 NEXT
670 PRINT "  "  : SC=0:IF#=" " THEN#300
680 FORDY=36075:150 FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
690 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
700 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
710 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
720 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
730 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
740 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
750 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
760 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
770 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
780 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
790 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
800 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
810 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
820 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
830 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
840 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
850 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
860 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
870 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
880 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
890 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
900 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
910 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
920 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
930 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
940 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
950 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
960 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
970 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
980 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
990 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150
1000 PRINT "  "  : FORDY=36075:150 FORDY=36075:150 FORDY=36075:150

```


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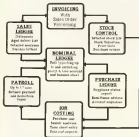
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Mind Stretchers?

Book: Commodore 64 Mind Stretchers

Author: Don Conway
Publisher: Century
Cost: \$5.25

Reviewed: Dorian Costare

This book contains a mixture of games and utilities — some 40 programs in all. There is a utility editor, a character editor and odd novelties like *Mastermind*, *Snake*, *Life* and *Poker*.

There is nothing particularly wrong with this book, except that it is two years late. The days when you could get new books of 140 best programs for your — — are long gone. More users are now making more interesting

games than the flood of computer books over the past year, there is surely little scope for titles which do no more than bundle collections of programs together. More interesting please.



Beginners guide to the Vic 20

Book: The Assembly Easy Way To Program Your VIC-20

Author: Peter Skelton
Publisher: Incredible
Price: £3.95

Reviewed: David Stephenson

If you've struggled with the manual, then this is the book you've been waiting for! That's how the book starts off, and it

explains what level it is aiming for, but if you have mastered the manual, don't let that put you off considering the book. It is one of the best I have yet seen from Incredible. Like many of their books, it is well presented and prepared, it is very easy to read and easy to follow, even for an absolute beginner. Unfortunately it does have about two printers errors on each of the 12 chapters, but that shouldn't spoil your enjoyment. Also, the author has a refreshing sense of humour which shows that he has enjoyed writing the book.

The book has been set out with plenty of example programs, with lots of helpful pointers for emphasis, and throughout the book lines clear print is used, so if you've been staring at a screen for hours, this book shouldn't give you any problems.

Snippets take you from simple things like how to set up your own computer, use of the screen and keyboard, through to how to make the most of FILES, POINTS and Strings, and also touches on the available peripherals.

The author himself rates this as a book for the absolute beginner — well, it is, but it could also be a valuable title for the beginner who has perhaps moved up to a Vic. The programs included range from simple conversion programs to 2k or so educational games. Considering the price of many books these days, you could do a lot worse than buying this one.

After the arcade

Book: Working With Easy Script
Author: Ronald McMillan
Publisher: Granada
Cost: £3.95

Reviewed: Steve Ross

When arcade games began to lose their thrill, what the thought of tapping yet another slice began to pall, most people turned their minds to more serious applications. Perhaps the most common technique use of micro is word processing. For 4k users, this generally means *Easy Script*, which is Commodore's own brand word processor for the 4k

In *Working With Easy Script*, Ronald McMillan adopts a straightforward approach, encouraging the reader to start word processing immediately and learn by doing. All the basic commands are here, from inserting and deleting text to word wrap and page size. There is even a sample letter from Mark Corrigan to JR Kling — Ronald McMillan must be a Dallas fan!

The book will be more useful for beginners than for experienced users, but there is something for almost every one. The only real criticism is that the sections on printing and page fitting are rather clumsy, but then it is a book which deserves a book in its own right.

Advanced handbook

Book: The Advanced Commodore 64 Handbook
Author: Peter Lupton and Peter Anderson
Publisher: Century
Cost: £5.95

Reviewed: Phil Hunter

If it is supposed you are an experienced user of a 64, who is proficient in Basic and would like to go further, you have considered Commodore's

PROGRAMMER'S ADVISORY GUIDE but that part of a non-technical you would particularly like to experiment with sound and bit set graphics, in Basic and Assembly, is understood the *Basic Interpreter* and to add a few extra commands to Basic. The trouble is that you have been unable to find a suitable book to assist you.

Look no further! This superb volume is the very thing you need. Illustrated at a competitive price to the *Commodore 64 Handbook* by the same authors, it contains an overview of a well-written, informative and useful volume for any 64 owner's bookshelf. As well as covering the points mentioned earlier, it provides a comprehensive guide to the use of disks and printers as a means for superior to Commodore's own offerings. Add to the numerous listings of program examples and utilities, and you have a publication which is hard to beat.

This is indeed a book to dig out in confusion and explore in depth. It is packed with information presented clearly and logically, with several helpful appendices it would almost be worth £5.95 for the 64 to contain alone. No other volumes in the series which is generally non-existent, but compared with the rest of the book, this is a minor criticism. Highly recommended!

Learning with Adventures

Book: Learning With Adventures Program
Author: Rosetta McLeod
Publisher: Incredible Home
Cost: £5.95
Reviewed: Jeremy Simon

Computers are education in a much broader phase. While computers are often used in schools, it is usually for administration or computer studies. There are increasingly few instances where computers are used in English, geography or History.

However, Rosetta McLeod has set out to show how computers can be used to teach a variety of subjects including logic, use of English and map drawing.

Concentrating on four comparatively available adventures — *The Jesters*, *Parkville*, *The Quest* and

Search! — Rosetta McLeod explains how parents and teachers can use adventures and how to use them in popular educational programmes. For example "Write a review of *The Mobile for Inclusion* in a computer magazine".

The book is illustrated with pictures and examples taken from Rosetta McLeod's paper on *Adventures*. An extremely interesting and worthwhile book, of a little price at £5.95.



ANSWER BACK

Standard abbrs.

WHEN TYPING in a program recently I discovered that standard abbreviations used in IBM manuals protect strange but consistent results when typed. I (MNF) found that FORD but PDATA for example. How and why does it happen? And can Turbo-loading programs such as a Flashback change the computer in any way? P. C. Smith

ALL UNINSERTED characters after a RETURN will be inserted, but may be avoided by shifting them keyboard characters which produce graphics when shifted are interpreted as letters, and converted into keywords. You can avoid this by placing them within quotes.

What when you enter P (PRINT), the P is converted and the shifted Q is converted into the keyword DATA. On other IBM machines the conventions may be different. However, if you use a line (on the 64) or any other basic I machines) such as 00 READ "data" E, then all data after the shifted E will vanish, and the error message "Syntax Error" will appear when listed.

I haven't heard of any message being passed by turbo loaders, although I haven't read the Flashback programs you mention.

Restore line

I HAVE a book called More Basic Computer Games, and cannot make the longest game work because it uses RESTORE (see together) commands. I've tried a number of different ways of preventing these commands, but my 64 won't accept them. Can you help? D. Cull
West Tilbury
Chesham

CODE) codes have the command "RESTORE" line number? — CBM Basic does not. The data pointer is set to that line, but in the current DATA statement is in the case in Commodore Basic. You will have to insert the READ number, and also use a marker as the first line of DATA on the line you wish to RESTORE.
10 READ A-B-C
20 "marker" THEN FOR
30 I=100READ A,B
40 NEXT I
50 READ A,B
60 rest of program
70 data exp. 1,1,3,4,5,6,7,8,
9,10
80 data marker, 1,1,12,13,14,
15,16, 17,18,19,20

64 to 3000

WILL YOU be in know of there is any hardware available which will let me use a Commodore leaves 3000 disk drive and printer with my 64? Jon Boycott
Farnham
Sussex

THERE ARE several suitable interfaces available, for instance the C-Board (SEE 440 catalogue, price £59 plus VAT from SCI, 47 London Road, Southborough, Tecknidge Works, Kent, phone 082-2744). This allows the 64 to access and control all CBM (SEE) peripherals. The cartridge plugs into the rear of the 64 and accepts a standard FDC (SEE) lead to connect to the first peripheral. Subsequent devices are daisy chained with standard (SEE) (SEE) leads.

However, if the software you are needing runs the spare from SCHE to SCVFF then you cannot use this cartridge. In this case you might want to investigate the DASH loader or the Escapade, now loaded by Commodore marketing and featured in October's Commodore Handbook.

PRG for paddles

CAN YOU give a short routine explaining the use of

paddles? I have a pair lying around the house doing nothing because I don't understand how to use them! Jason's Dave
Stockton
Gloucester
THE (AUTIVE for using paddles is rather long and corresponds some machine code. You'll find it listed and explained on pages 346-347 of the Commodore 64 Programmer's Reference Guide.

Finding the address

IN THE August issue of Commodore Magazine there was a program called ADDRESS by Chris Payne in order to get the program to work efficiently, large amounts of data need to be stored on tape. Could you make some suggestions on how to arrange and store the required amounts of data, or suggest some books which explain data handling in full? P. Howard
West Bromwich
Midlands
Business Applications for the Commodore 64, by James Hall, published by Newnes, should be of great help to you. It contains programs and subroutines which deal with data handling both on disk and tape.

Flashes and crackles

I HAVE recently purchased a Via 22 for my son, and have been picking up interference on the screen, showing up as short flashes and crackles. The TV and the computer itself appear to be OK, but so we are about half a mile away from a Plenary factory I suspect that the Via is picking up some sort of signal. Can you suggest any way to shield or isolate it?

TRY a surge protector ring, which eliminates voltage surges on the mains. This could be caused by your hooking up the same circuit as Plenary's, or a local lightning, or even other electrical appliances in your own house. You can obtain such a ring for £10-00 from

Rowbridge Chief Ltd of
Inverness Road, Brighton,
Sussex, BN2 2DF

Expander in print

I HAVE RECENTLY purchased a Via 20 with Super Magazine, and I find it very hard to find any programs utilizing the expander. Could you suggest any books? Paul Gerrard
Tipton
Birmingham

YOU CAN find many programs using the Super Expander in a book called Via Graphics by Nick Hamilton, costing £5.95 from
Newsworld, The Old Place
Barnstaple, 43 Gloucester
Crescent, London. All the programs in this book are also available on cassette from the publishers.

Cobol query

I AM A military programmer in the world of computers, but I understand nothing to coding them. This year we will be a cadet course.

I've been told that it would be a help if I could gain some experience in Cobol, but I can't trace a supplier of a version of this language. Can you help?

Michael Fox
Rugby
Leicestershire
COBOL on the 64 could only be used in conjunction with the new Commodore CP-M cartridge. CP-M is an operating system which allows access to a wide range of business programs, and you should be able to find a suitable version of Cobol from this cartridge in Great Britain, or the time of writing, so few releases have been listed for the Commodore CP-M cartridge.

If you need help with a technical query or problem write to:

Jack Collins,
Commodore Magazine,
12-13 Little Newmarket
Street, London
WC2E 8JF

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Yes a FREE Light Pen! with every **GRAPHIT!** Graphit is the answer to drawing! designed for painting using the light pen of course which essentially has a full 3 year warranty! Graphit will manage other things about you to:

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GRAPHIT is available on disk and tape. Tape version is £19.95 and disk version (recommended) is £19.95



All you 1840/1841 disk users **DISOM** is here at last! Draw a disk member you have been waiting for it will allow you to:

- read/write blocks from/to the disk
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Do you use tapes? Are you sick and tired of waiting for your programs to be Loaded? Servo! Transfer the tape? Then you need a **TORNADO!** Tornado allows you to save/Load/Write your Basic/machine code programs faster than a **THUNDER** disk drive itself! Due to popular demand! Tornado now comes with new and more powerful commands plus extra instructions to assist you in making fast versions of your existing machine code/Basic programs! Tornado is available on tape for **£29.95** and **£9.95** via 30.

Do your **Hardtop** and **Preston** boys often fail? Do you want to come out of those crashes? Or get into those unbreakable programs? Then what are you waiting for, get yourself a **BREAKER!** Breaker switch and let your computer know who is the boss! Breaker can be connected to your machine in seconds! No soldering! Included with the Breaker is a copy of basic recovery software on tape. Now available for any **COM 84** or **Vis 30**.

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BSF CSL, 82 FURNACE DRIVE, CRAWLEY, W SUSSEX RH10 6JE.

Please send me Tornado at £9.95 + my free Breaker

Please send me Breaker at £7.95

Please send me Spin File at £7.95

Please send me LONDON at £19.95

Please send me Graphit at £19.95 (tape)

Please send me Graphit at £19.95 (disk)

Please send me DISOM at £9.95

I enclose cheque/PO/book to the sum of £

Name Computer

Address

Tel:

Please use this form and check before use. All prices are inclusive of p.p.h. (order only) add £3.00 outside UK. Please give to: **BSF CSL, 82 FURNACE DRIVE, CRAWLEY, WEST SUSSEX RH10 6JE.**

Eureka!

Win one of ten CURRAH Speech 64 units



AMPLIFIED the latest development in the industry for the competition sponsored by **Donnet**, the company responsible for the remarkable new multi-part advertisement **Essentia**!

Ten prize winners will receive Currah Speech 64 voice synthesizers for the Commodore 64. This unit, reviewed in last month's **Commodore Magazine**, "speaks" in four different voices and can

be programmed in Basic to produce any words you want.

Since the prize is so valuable, the competition in all about words — how many English words of four letters or more can you make from the name **ABCDHIKMOLES**?

No proper names, plurals or abbreviations are allowed. When you've completed your list, fill in the competition

form and post it in the address given. Don't forget to complete the re-breaker in an apt, working and original memory in 14 words or less.

The ten winners who give the biggest correct lists of words will win the speech synthesizers.

Good competition rules apply, and the Editor's decision is final. Closing date is the last working day of December.

I DISCOVERED WORDS. THEY ARE:

Use extra paper if necessary.

TELEBREAKER Speech 64 says it all better!

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ADDRESS:

POST TO: Eureka Competition, Commodore Magazine, 12/83 Little Newport St., London WC2R 2LL

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COMMODORE
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(NEVEREND OR JOYSTICKS)

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